INDEX TO ADVERTISERS AND CONTENTS ON PAGE 32.

THE FOUNDRY

VOL. 17. DETROIT, MICH., FEBRUARY, 1901 NO 102.

PUBLISHED MONTHLY BY
THE FOUNDRY PUBLISHING CO.
DETROIT, MICH.

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SUBSCRIPTION PRICE:

$1.00 a year in advance, postage prepaid in the United States, Canada and Mexico.
$1.75 a year to other countries, postage prepaid.
Single Copies, 15 Cents.

ADVERTISING RATES ARE PRINTED IN EACH ISSUE

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We want to obtain examples of current foundry practice. Photographs, drawings and descriptive matter, showing just what is being accomplished in the foundries of to-day, will be cheerfully paid for.

We can not furnish a continuous set of back numbers beyond September, 1900.

Entered at the Post Office at Detroit, Mich., as second-class matter.

Trade Outlook.

The month of December witnessed a considerable increase in the amount of iron melted by the foundries. The annual stock-taking may reduce the consumption during the month of January, especially among specialty shops, where the stock on hand will take care of temporary demands. In a recent review of market conditions Rogers, Brown & Co., of Cincinnati, say:

"A few good sized contracts have been placed, but most of the orders have come in for small lots for quick delivery. Nearly all reports received from consuming districts indicate that consumption is gradually increasing, and prospects of business for the current year are first-class, but in a few instances it has been said that works are shut down or are running with less than usual force. The malleable companies seem to be full of orders, but they are using up iron bought heretofore and have not been in the market to any extent of late. The cast iron pipe business is apparently improving, although prices are not satisfactory.

"The preliminary reports show that during December production was increased to a considerable extent, but furnace stocks have gone off slightly.

"The determination of prices of lake ores for next season's delivery will probably exert a decided influence on pig iron consumers. Many are waiting to see what the ore men will do. It must be remembered that Northern malleable and Bessemer iron are now being sold at less than cost of production, and if the price of Bessemer ore is dropped, it will not be possible for makers of Bessemer pig to reduce prices correspondingly and operate at a profit. They are now discounting the prospective decline in ores. This holds true to a large extent also regarding foundry irons made with lake ores."

In their New York letter, the same company writes as follows:

"The question of how far consumers have covered for their pig iron requirements for the first half of the year is receiving attention of makers. The best opinion is that while leading consumers have largely provided for expected needs until summer, there are two elements in demand which will take up the unsold remnant of furnace product and keep the market firm. The first is the needs of the rank and file of smaller melters, which in the aggregate amount to considerable tonnage. The second is the enlarged demand of the big foundries and mills as new and unexpected work comes up. Under the latter head, the cast iron pipe foundries are now bidding on work which, if secured, will make the various shops busier than they have been in mid-winter for years past. Among jobbing foundries, and in other lines, there is proof that the excess of work over the normal will be considerable. Taking it all together, therefore, it is believed that less than half of the pig iron needed by consumers for the next six months has already been bought.

"In several particulars the situation in iron is exactly the reverse of that a year ago. We were then paying three to four dollars for coke at the ovens, and Bessemer pig was held at $24.00 at Pittsburg. But there was no demand, and the event proved that buyers of all classes of iron and steel products had struck for much lower prices, and staid away from sellers until they got them. In Bessemer and foundry pig, as well as in billets and some other forms, there was practically no buying from January to October. Prices crumbled away a third—in some lines a half. The rate of production fell off nearly a third.

"Now we are on a low level of prices, with no disposition by makers to push them higher. Demand is active and growing. Furnaces are blowing in. Stocks are decreasing faster than they piled up. Consumers' yards are in many cases bare. Projects for new construction, instead of being held back by high prices and political uncertainties, are taking shape in all directions. Bonds on the sale of which depends the building of water works, electric lines, railroad extensions, etc., are in demand. The financial sky is clear and speculation is rampant. Only in Germany and Great Britain does the year open in gloom.

"There is good reason to look for a year of business in large volume, but without demoralizing fluctuations in values."

The Foundry Business in 1900.

At the beginning of last year the demand upon the foundries of the country was something unprecedented in a decade at least. Manufacturing concerns were clamoring for the delivery of castings at a rate which forced an almost universal enlargement of foundry plants.

The difficulty of procuring castings promptly lead many manufacturers to establish foundries in connection with their own works. It must be remarked here that the advanced price of castings also had something to do with the building of foundries by the users of castings. Those familiar with the trade know that competition and lack of orders had forced the price of castings to a point where only the well equipped shop, with careful management, could make a fair profit. With full order books it was naturally to be expected that the price of castings should increase, even if no advance had occurred in the cost of iron, coke and labor. Coupled with the latter, the sharp advance in the price of castings became the more pronounced by contrast with the figures of previous years, and more than one consumer of castings built a foundry because he thought that the foundrymen in general had conspired to tax him beyond the limit. It is unnecessary to say that this erroneous view of conditions over which the foundryman had no control, became apparent the minute these people put their own shops in operation when they learned that the cost of producing castings was greater than they, with their limited knowledge of foundry operations in general, had supposed.

Quite a few concerns who built shops of their own within the past eighteen months, are today buying castings in the open market and letting the foundry department of their works lay idle. They have learned in many instances that it is cheaper to buy castings than to make them.

Failures among foundrymen have indeed been few, especially so when when we consider the great fluctuations in the cost of raw materials. For a presidential year there was very little interruption in the operations of plants.

We referred at the beginning of this article to the great demand for castings at the beginning of 1900, and believe it is worthy of mention that many of the consumers who were calling most loudly for the rapid delivery of castings were actually storing a large percentage of these away for future use. This policy began to reflect itself in the early part of the year, when contracts were not renewed with their usual regularity.

The spirit of consolidation, which has been so rampant in this country during the past two years, has not been without effect on the foundries. It is to be noted that all of the combinations touching the trade are in special lines, and that the chief object of their organization has been to decrease the cost of their product through abolishing seperate officials for each plant and the maintenance of individual agencies. None of these consolidated companies can in any way be considered as a trust, as far as the foundry business is concerned, for anyone having sufficient capital can manufacture the same product as they do.

Where great benefit is derived from a consolidation of plants is in the distribution of the finished product which can be delivered from the nearest plant. It should not be forgotten either that the manufacturing end is also brought to a higher standard, for the methods

in vogue at the best managed branch must, in the natural course of events, be transmitted to the balance.

There is another feature wherein the consolidation of a number of plants have proven advantageous. In the handling of labor, if demands should be made which could not be granted, the closing down of one plant altogether would not, except in times of great activity, materially affect the volume of the manufactured product. A strike under such conditions is much less far-reaching in its consequences than would be the case were each plant under individual management.

Among the consolidations which affect the foundry trade may be mentioned the American Bridge Co., the American Car & Foundry Co., the American Radiator Co., the American School Furniture Co., the American Shipbuilding Co., the Central Foundry Co., the International Steam Pump Co., the Magnus Metal Co., the Niles-Bement-Pond Co., the Pittsburg Stove & Range Co., the Pittsburg Valve, Foundry & Construction Co., the Standard Sanitary Mfg. Co. and the United States Cast Iron Pipe & Foundry Co.

From reports at hand we learn that a hundred and sixty-eight foundries changed hands last year, the total number of plants making iron and steel castings being now four thousand, four hundred and nineteen, an increase of two hundred and seventy-four during the year, or a little over 15 per cent. Taking these figures into consideration, the foundry trade appears to be holding its own. Of course, this increased number of shops does not in any way indicate the increase in foundry capacity, for we all know that older plants in great numbers erected large additions during the twelve months just closed.

Foundry Flasks.

Some time ago the "Mechanical World" of Manchester, England, reprinted the paper on "Foundry Flasks" prepared by the late Mr. Eli H. Pearce, and read at the Chicago Convention of the American Foundrymen's Association. The following communication appeared in the same journal and we give it room here to show the difference of foundry practice in the two countries:

"I, as a practical molder, and one who seeks to foster proficiency and modern methods in the art, must emphatically denounce the idea of wood flasks. Any molder hailing from North Britain, where flasking is to-day nearly perfect, would laugh at the idea of any molder reading a paper on foundry flasks, and especially advocating the use of wood.

"I will illustrate, in the first place, the box parts or flasks used in a light workship, say at the Carron Iron Works, N. B., where about 4,500 or 5,000 boxes, drag, and top part will be in use every day, and comprising a great many different shapes, such as flat boxes from 6 by 6 by 6 inches up to 48 by 48 by 8 inches, also rain-water goods, furnace pans, etc. Imagine this firm using wood flasks! Why, they would require the contents of a forest and an army of joiners to keep up the plant. But this is very briefly how it is done: Say they require to make a set of new box parts 36 inches broad by 60 inches long by 9 inches deep—that is, including drag and top part. Perhaps they want twelve full boxes, and to be wrought by hand—which they all are—until they reach a very large size. The box is the same all but lifting provision for the crane, such as a swivel at each end, or two bowl handles on each side. The pattern for the above box is made by a patternmaker—the drag part and the top part.

"The strength required for all these boxes varies, but the one in question would be, for the outside ⅝ by ½ inches, the top part bars the same, and the drag bars 1½ by 1 inch.

"Side snugs, having provision for pins, are cast on, as also are hooks and eyes to clamp the two together when closed, and the requisite number of lifting handles for turning the drag and parting and closing the top part, two at each end and one on each side at the center. These boxes as a rule require no fitting, as generally they are cast from an original pattern, with all its accessories cast—guide pins, hooks and eyes, and handles—so that the affair is simple, speedy, perfect, and ecenomical. These boxes will work for years, although the replacing of a part is next to no cost at all.

"The boxes are all got up under the same rule, and can be utilized to work the plate system, or to suit any kind of tank or kiln plates, etc. There is nothing more perfect than the equipment in flasks of a light molding shop, nor less costly to maintain.

"The jobbing department in any class, from building to marine work, is equally as easily equipped with flasks, and the rarest thing one sees is the casting of a new box part in any good-going jobbing shop. Wallace Foundry,

Dundee, is almost perfect for simple and secure flasks for heavy work. The following is included in their stock, and will be found superior to timber. Supposing we say columns from 3 to 6 inches diameter, and any length. These can all be faced at any time by using straight stretches of flasks, say 9 inches broad by 7 inches deep, metal 1 inch thick, with side projections 3 inches out at each end for bolting, as many lengths together as one requires, also a few headpieces, all one size at the projection, but varying in breadth and height, in order to meet extra large flanges or heads. Then a few more lying about, say from 15 inches broad and 11 inches high, with heads to suit, and one is well in for columns and girders up to 12 inches broad and up to any length desired. One extra large top part included, and one can never be caught napping. Regarding square or rectangular box parts, a small space, and not a large expense, will equip all that is required. An outside frame and one or two loose bars, and one can cast a flask that will last as long as the youth that made it. I have seen boxes, say 48 inches square, top and drag, for crane work, and one could pick up frames from 3 to 6 inches deep, which could all be put together, giving a box 48 inches any way.

"Then a few large top parts lying around is all that is required. Space forbids me saying any more just now, but I will take up the flasking affair with any comrade in order to free from contamination the faculties of our young molder friends. Wood flasks are positively a humbug, and should not be encouraged." JOHN SANDS.

Falkirk, Scotland.

* * * *

While we believe that many jobs are made in wooden flasks which could much more economically be made in iron flasks, still it is our opinion that wooden flasks for certain classes of castings possess more virtues and are not half as much humbugs as Mr. Sands would have us believe.

It is a well-known fact that the foundries of Great Britain and those of the Continent use iron flasks almost exclusively. While we have no doubt of Mr. Sands' assertion that the method of making flasks in North Britain is nearly perfect, yet in order to arrive at the relative merit of iron and wooden flasks we would rather state the question in a different manner.

Does the molders of North Britain turn out more castings per man with iron flasks than the molders of the United States with wooden flasks? Is the cost of flasks and repairs of same per pound of castings greater in the United States than in Great Britain?

Taking up the first we have heard it expressed by foundry proprietors and managers from the old world that the molders on this side turned out more castings in the same length of time than any other workmen they knew. Take our stove foundries, where wooden flasks are used almist universally, and substitute iron flasks, and how many molders will put up the same day's work as they are doing now?

For light castings of this kind the wooden flask is superior to the iron one. It permits a molder to make more molds because it is easier to handle, and it lasts a very long time with reasonable care, as the castings are shaken out at once and there is consequently no chance of burning either flask or bottom board.

If Mr. Sands will visit some of our foundries he will find that they do not have a forest or an army of carpenters either, in order to keep in operation. On the other hand, while we admire the beauties of the iron flask, we have a suspicion that these are not made without cost, nor kept in repair for nothing.

It is a question whether iron flasks of any kind do not cost as much or more than wooden flasks. It takes time to change the bars of an iron flask just as well as a wooden one. Rusty bolts cannot be taken off with the fingers nor guides adjusted after the same fashion.

What determines the relative value of iron and wooden flasks is not the length of life of either nor their original cost. It is the output which can be obtained from them that counts, and as far as light work is concerned, a molder will turn out more castings with a light wooden flask than he will with a heavy iron flask.

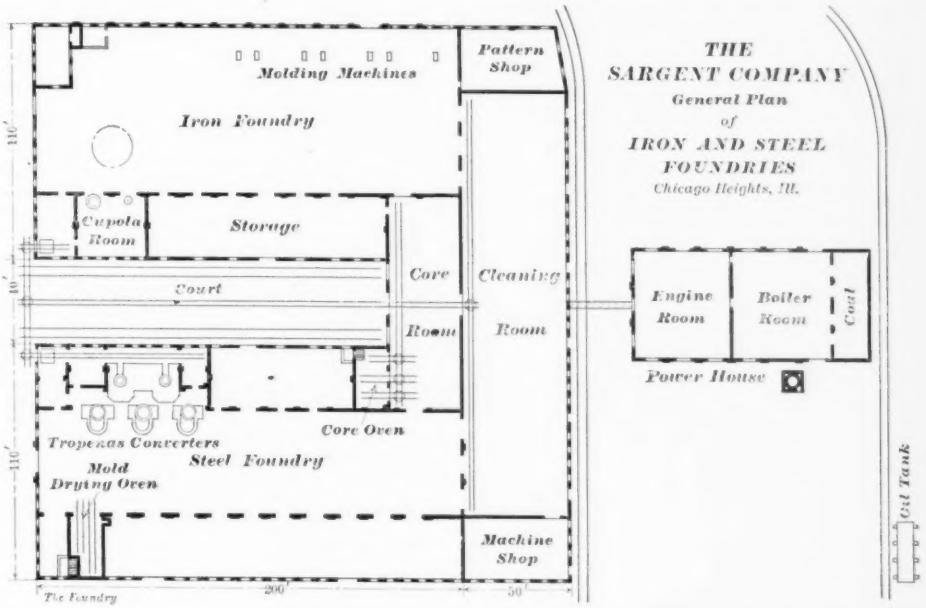
The tendency of the age is not to furnish workmen with clumsy tools because these will last forever, but to give them light and handy appliances with which they can turn out the greatest volume of product. Iron flasks have their places where they are superior to wooden ones, but the latter also have claim to recognition, a fact attested by their continued use. If the universal adoption of iron flasks would in the least increase the output of

American foundries, our friend, Mr. Sands, can rest assured that the change would have been made long ago.

New Steel and Iron Foundries of the Sargent Company.

The Sargent Company has recently erected at Chicago Heights, Ill., a plant for the manufacture of iron and steel castings, which, from its general design and the details of its construction and equipment, is particularly fitted for the economical production of both classes of work.

Heretofore the majority of small castings have been supplied by makers of semi-steel or crucible steel; the former metal, of course, not having the properties of actual steel, and



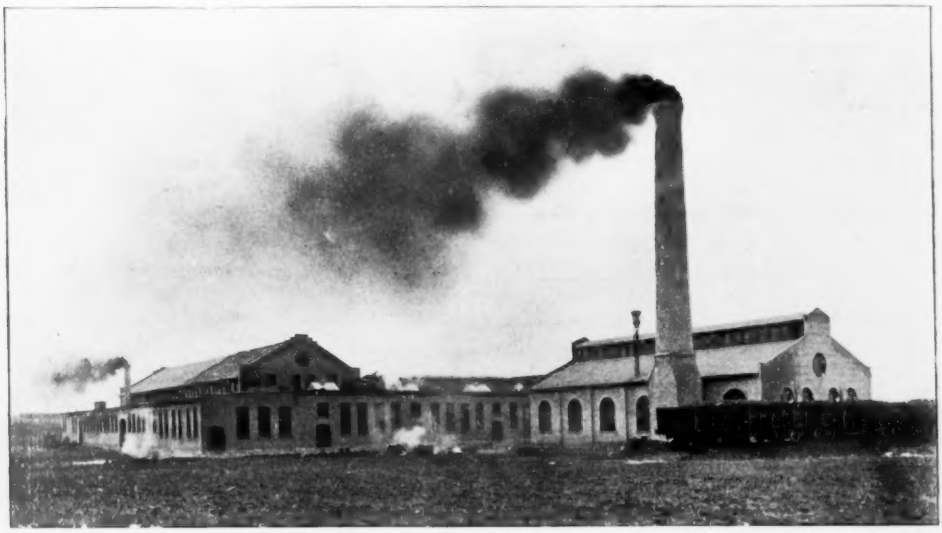
the latter being very expensive, while both of these processes necessitate a considerable time in the turning out of even moderate sized orders. In the course of its business of manufacturing the larger steel castings the Sargent Company was often called upon to fill orders for small castings. They were formerly filled in crucible steel, or as best might be done in open-hearth steel. Through the experience acquired in the manufacture of steel in these two processes the firm was led to investigate and finally adopt the Tropenas process for this small work, and since March have had in operation a plant at Chicago Heights equipped after this method.

As stated, this method was adopted after several years of experience with open-hearth and crucible steel plants, and after a careful study of the subject of steel making at home and abroad, where the Tropenas process is in successful operation in some forty different plants. It enables to be manufactured small steel castings of excellent quality, machine molded, and the larger the order the quicker the proportionate delivery. These castings do not require annealing, and consequently the day after the pattern is received at the foundry it is possible to turn out a day's work, running from one to several hundred pieces, and the day thereafter the castings may be cleaned and shipped.

The Tropenas process consists in the use of special converters in which pig iron and selected scrap, previously melted in a cupola, are subjected to an air blast of 3 to 4 pounds pressure per square inch, directed horizontally across the top of the molten bath. This action generates intense heat by the combustion of the metalloids in the pig iron, and after a period varying from 16 to 20 minutes, depending on the quality of the charge used, there remains in the converter a bath of nearly pure iron. Addition is made of ferro-manganese and of ferro-silicon, or both, to bring up the silicon, manganese and carbon contents to the specified proportions, when the metal is drawn off into a ladle and poured.

The process is very simple and the product very regular.

The peculiar advantage of the Tropenas process lies in the fact that the resultant metal is much better and consequently more fluid than that produced by any other method, and it is this fact which makes it valuable in the manufacture of small and intricate castings, as it can be poured over the lip of the ladle in as small a stream as desired, and will run through thin sections, producing solid castings free from pinholes and cracks. Any grade of metal is readily produced by varying the additions. It is consequently valuable, not only in the production of low carbon steel of the maximum permeability, so much desired in electrical castings, but also in the production of special grades of hard steel for mining machinery parts, and other purposes.



THE IRON AND STEEL FOUNDRIES OF THE SARGENT COMPANY, AT CHICAGO HEIGHTS, ILL.

The output of the iron foundry consists largely of railway brake shoes, which average about 25 pounds in weight, and are, to a great extent, machine molded. The steel foundry is devoted to the production of a general class of castings varying in weight from a few ounces to several tons.

The general arrangement of the buildings is shown on the plan. The steel and iron foundries are seperate parallel brick buildings 110 feet wide by 200 feet long, with an open court 40 feet wide between them. A cleaning room, 200 feet long by 50 feet wide, and a core room, 40 feet by 100 feet, connect the foundry buildings at the north end, and are arranged for the use of both foundries. The power plant is in an independent brick building, 110 feet long by 50 feet wide, situated just north of the cleaning room.

Supplies for both foundries are delivered from cars on switch tracks in the court between them, finished material is handed direct into cars on a track just outside the cleaning room, and coal and fuel oil are unloaded from a track adjoining the power house.

The iron foundry has a clear molding space, 80 feet by 200 feet. The cupolas, placed in a room at one end of the molding floor, are 41 inches and 66 inches in diameter, and were made by the Whiting Foundry Equipment Co. These cupolas have a daily capacity of 60 tons. The blast for the cupolas is furnished by a No. 11 Buffalo Forge Co.'s fan, motor driven.

Materials for charging into the cupolas are brought on train cars from the yard and raised to the charging floor by a pneumatic-hydraulic elevator made by Craig, Ridgway & Son Co.

The metal from the cupolas is tapped into track ladles of 1,500 pounds capacity, running on tracks lengthwise of the molding floor, and is distributed from these by buggy ladles running on channel iron tracks between the rows of molds.

A five-ton pneumatic-hydraulic jib crane,

made by Craig, Ridgway & Son Co., is situated in front of the cupolas, convenient for heavy work.

Wherever possible, all patterns are molded by machinery, which insures uniformity. The molding machines include three-air operated Tabor stripping plate machines, four Tabor vibrator machines and several Pridmore hand-molding machines.

The steel foundry has a molding floor 50 feet wide by 200 feet long, served by two Shaw electric travelling cranes of 15 tons capacity. A lean-to at one side of the steel foundry affords additional molding space and contains a mold drying oven.

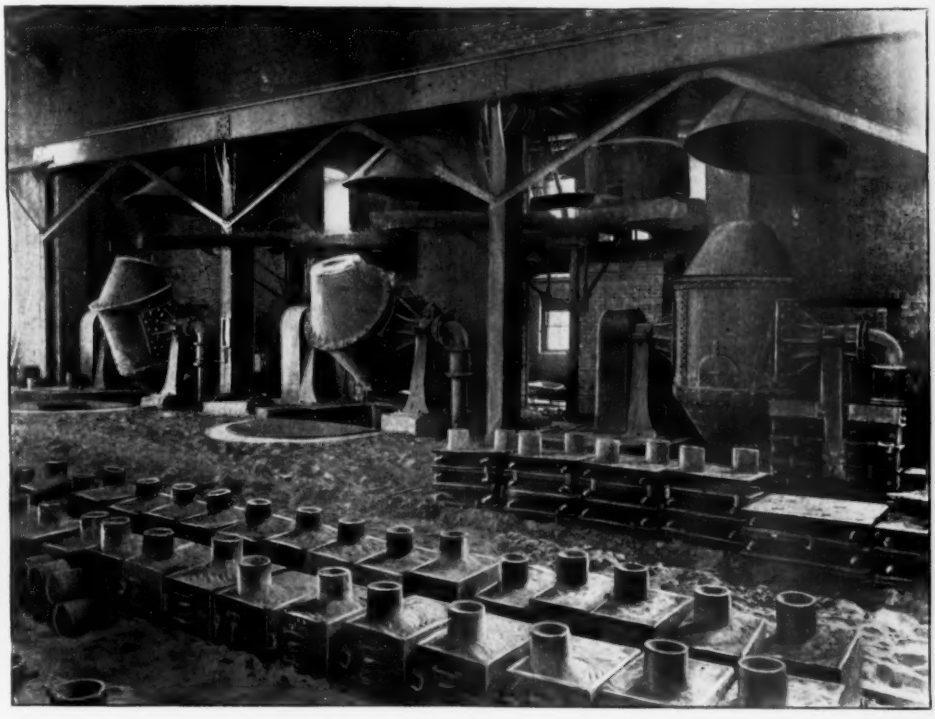
The converters, cupolas, and sand storage rooms occupy a space 30 feet in width on the opposite side of the steel foundry.

The steel is made from iron melted in two No. 5 Whiting cupolas in the rear of the converters. The molten iron is run into the converters by means of swinging spouts. The converters are three in number, each having a capacity of two tons per blow. The steel is made by the Tropenas process, and this installation is the largest of its kind in the country.

The blast for the cupolas is furnished by a duplicate set of No. 7 Sturtevant fans, motor driven, so arranged that either or both cupolas may be driven from either fan.

The converters are tipped by hydraulic power. The blast at 3 to 4 pounds' pressure is furnished by a No. 4 Root's pressure blower, direct connected to a motor.

The cleaning room has a seperate set of tumbling barrels and emery wheel stands, for each foundry, each set being driven by an independent motor.



TROPENAS CONVERTERS IN STEEL FOUNDRY OF THE SARGENT COMPANY.

An exhaust apparatus removes the dust from the tumbling barrels.

Both the cleaning room and the core room are paved with cedar blocks.

Electricity, at a voltage of 220, is used throughout the plant for the operation of the travelling cranes, the motors for the machines and pattern shops, to run the cupola fans and the blower for the converters, and for the lighting.

Compressed air operates the elevators and air hoists, the jib cranes, the molding machines and also the oil burners for heating the converters and ladles.

The power plant consists of two Brownell tubular boilers, 18 feet long by 72 inches in diameter, and an 18 inch by 42 inch Reynolds-Corliss engine belt connected to a Western Electric 150 K. W. generator.

Compressed air is supplied by an Ingersoll-Sergeant duplex compound compressor, with a capacity of 700 feet of free air per minute, compressed to 100 pounds per square inch.

The buildings are heated in cold weather by an exhaust steam-heating apparatus installed by the Buffalo Forge Co.

STEEL FOUNDRY OF THE SARGENT COMPANY.

The whole plant is so arranged that extensions, doubling its capacity, can be readily made without interfering with the present methods of operation.

Evening School for Workmen.

While nearly every large city provides in one way or another night schools for the use of those who cannot attend day schools, the smaller towns seldom offer such opportunities. Too often when a mechanic reaches that stage of life when his early education would be of value to him in his every-day work, he finds that the greatest portion has left his memory. It is needless to say that not only the man, but those who employ him as well, will be benefitted by having him acquire sufficient knowledge to do his work intelligently.

Some time ago we mentioned the fact that the American Machine & Foundry Co., of Hanover, Pa., had instituted and evening school for its employes, and in a recent letter Thos. M. Brown, treasurer of that concern, writes us as follows upon this subject:

"We have had this school in operation now some six months, and are pleased to report splendid results. The foundry boys, as well as the machine boys, have taken to it with a will, and attend it regularly two nights a week. The school is in charge of our Mr. L. Schlutter, chief draftsman, who takes the pupils through the first elements of Arithmetic and as rapidly as possible, Algebra, Geometry, etc. Mechanical drawing is started at once, and no scholar is held back for the others, all being allowed to progress as rapidly as their talents will allow. We find that the boys especially are greatly benefited by their schooling, in the machine shop

particularly this is evident, as our work is of a high grade, decimals being used almost entirely, and the micrometer for measuring is the rule. The foundry boys are benefited more especially in the reading of drawings and making sketches, although the Mathematical end is of service to them, as much as to the machine shop boys. We are firm believers now in the night school for shops, and feel sure that many plants located as we are will find it greatly to their advantage to inaugurate the system.

"We have purposely omitted giving you details as to the cost of running a school to us, as well as to the boys, for the conditions are different in every town, and anyone starting such a school would have to be governed by the conditions of the town, so that the matter becames altogether a personal one."

There is no doubt but that a great number of young men, who spend their days in the machine shop and foundry, would take advantage of an evening school if the matter was brought to their attention. An intelligent workman is not only a better mechanic, but he is less liable to make unjust demands, than one who cannot judge for himself. It will pay shop proprietors and managers to give this subject more than a passing notice.

Curiosity Shops.

Not very long ago, and perhaps yet, in some places, the foreman can be seen sitting or standing at his desk looking over papers, periodicals, or drawings, walking leisurely down the gangway, stopping occasionally to instruct an apprentice or consult with a journeyman about some particular piece of work, its weight, the most convenient place to gate it, etc., approach the cupola tender, have a talk with him about the merits of different grades of coke and iron, the advantages of charging this or that way, etc., walk over and lean against the core bench, fold his arms and converse with coremakers about things pertaining to their business, passing along out to the carpenter and exchange a few ideas with him about the construction of flasks. But the departures from this routine is very perceptible in a great many shops in these days, and to the old-timers very interesting from a certain standpoint. Having procured employment in a foundry recently, and from the proprietor at that, I was told that the foreman would bring me a pattern. He done so, and after giving out jobs to all of the other molders, came back and helped cut the sand and dig out a hole, riddled a pile of Number two sand and mixed a batch of facing. Then he brought in a riddleful of coke to put in the stove, and after firing up the rest of the stoves he went in and mixed a batch of sand for the coremakers; then he got a wheel-barrow and helped wheel out the castings, stopping occasionally to carry in a flask for some one, mix a bucket of clay-wash, or give a lift. After noon he was in his undershirt breaking pig iron and assisting in wheeling iron up the run to the scaffold by pulling on the front end of the barrow with a long hook. In the evening, while the heat was being taken off, he was right in the thick of it, carrying the dutch end of the ladles and hoisting on the crane, but between taps he actually sat down to rest. Becoming interested in this Man, I made inquiries and learned that he was a molder all right, and his duties were the same every day, only that he unloaded coke and iron between times, and got as much as $3.00 a day; he was very popular with the men also. Another genius presides over the destinies of a steel plant in the same locality, and is to be pitied quite as much as the one just mentioned. Go in there to look for employment, and if he answers at all, when spoken to, his tongue is so thick he can't be understood, and the poor fellow is on the run all the time, and generally with a whistle in his mouth to signal the crane men, the noise of the chipping department being so intense that when one molder wants his partner to give him a draw, he must tap him on the shoulder and make signs to that effect. If anything goes wrong the foreman can't "ball you out" about it on account of the noise, and one never knows when he is discharged until he looks up and sees the "genius" pushing the lead over a piece of paper.

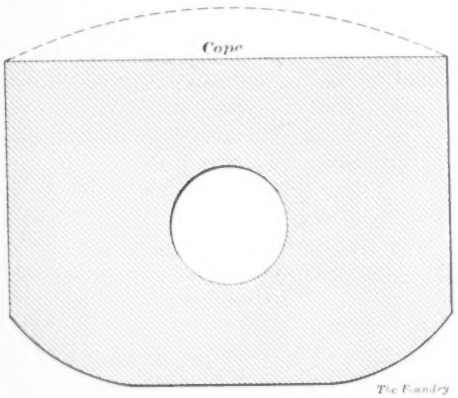
C. RITIC.

Answer to D. H. R.

Having read D. H. R.'s inquiry in the October number of THE FOUNDRY, and having had trouble of the same kind myself some years ago, I will give him my experience, and also the remedy I found.

I had a number of castings to make with a wrought iron pipe cast in them, as shown in sketch, but instead of coming out flat on the cope side, and true to pattern, they

invariably turned out like the dotted line on the cope side. When the castings were planed off on the cope side, they were honeycombed down to the wrought iron pipe. To



overcome the difficulty I had the wrought iron pipe filed smooth and tinned. I had no more trouble and castings came out clean and true to pattern.

OLD FOREMAN.

Sampling Pig Iron.

BY W. G. SCOTT.

In mixing by analysis, the first consideration is a correct sample representing the true average composition of the pig iron.

If the sample is not right, the results will be misleading and the chemical analysis of no use.

Pig iron bought on specification is usually sampled in the car, and after making an analysis of the borings, if found to be according to the specification, the pig iron is unloaded and neatly piled up.

The piles are generally about fifteen feet long and five feet high.

The two ends of the pile are built up first, laying the pigs across each other in the form of a square; when the two end piers are finished, the space between is filled in like cord word.

Each pile is marked with a numbered stake, which is driven in the ground at one end of the pile.

The cost of unloading and piling up the iron in this manner is about seven cents per ton.

There are several ways of getting an average sample of the pig iron, one method called the "ten pig sample" is to select at random from various parts of the car or pile, ten different pigs.

An equal amount of the borings from each of the ten pigs is mixed together and constitutes the sample.

Another method practiced by many professional samplers, is somewhat as follows: The sampler, in the first place, carefully looks over the cargo of iron, after which inspection he makes a mental note of the relative proportion of close, medium and open grained pigs; for instance, he will conclude that in a total of ten pigs there are five with a close grain, two medium and three open grained.

The sampler will now take one pig with a close grain, one medium and one pig with an open gain; from the close grain pig he will take five measures (i. e. a "measure" is a small cup holding about five grams of iron) from the medium pig, two measures, and from the open-grained pig, three such measures; these proportions being mixed together will form his average sample.

This latter method is open to serious objection as there is always an element of guess work in taking only three pigs and working by instinct.

A much better plan is to combine the two methods and take ten pigs, selected according to the relative proportion of close, medium or open-grain, then take an equal amount of borings from each and mix thoroughly.

In sampling from the pile where the iron is hard to get at, it is quite often a difficult matter to pick out ten pigs, but even in this case the chances of obtaining an average sample is unsatisfactory with anything less than six pigs.

Pig iron should be carefully sampled, and if there is the least doubt in regard to the composition, it should be resampled.

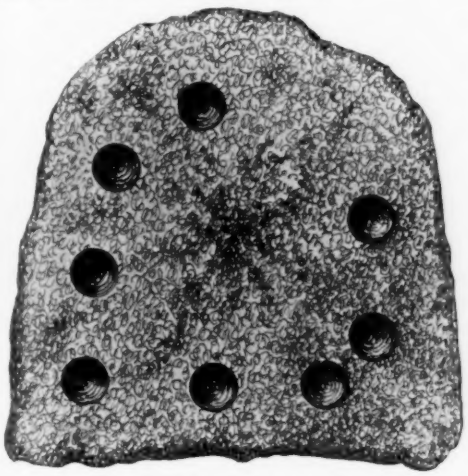
In cases of rejectment it is customery to resample the iron and make another analysis before condemning the lot, furthermore it must be remembered that the blast furnace or the party selling the iron, is allowed the privilege of taking samples and having them analyzed, therefore one has to be sure he is right before rejecting the material.

Having picked out the proper number of pigs for our sample, we then break each pig so as to expose a fresh surface of the iron.

Borings are taken from the face of the fractured pig for the sample, and it is better

to use a flat drill for this purpose, as a twist drill gives different sized borings according to the hardness of the iron.

The graphitic carbon in the center of the pig is slightly different from that in the chilled part or the outer surface, consequently the borings should be taken from a point between the outer part and the center of the pig, as shown in the sketch.



METHOD OF SAMPLING PIG IRON.

A chemist will require the following amount of borings for the different determinations, viz.: Silicon, 1 gram; sulphur, 5 grams; phosphorus, 2 to 5 grams; manganese, 1 gram; combined carbon, 1 to 5 grams; graphitic carbon, 1 gram.

In case of a check or duplicate analysis he will require double the amount, therefore the sample should not contain less than 30 grams by weight, or about a large tablespoonful by measure.

The borings are all placed in a sealed envelope, on which is marked in ink, the brand of iron, the car number and initials, the pile number, and the date of sampling; the package is then sent to the laboratory.

The chemist must now pass the borings through a 40-mesh sieve, and all borings too large to pass through should be pulverized in an iron motar, it being quite essential that the drillings be somewhat uniform in size.

After sieving, the drillings should be thoroughly mixed; we use a small machine for this purpose, which is an improvement over hand mixing.

The chemist is now ready to make the analyses required, after which he will give the foundryman or other party interested, a copy of the analysis.

The foundryman knowing the actual composition of the various brands of iron on hand is then in position to make a chemical mix.

It is customary to pay attention only to silicon and sulphur in ordinary gray iron castings, such as pulleys, gears, bed plates, fittings, etc., but in chilled roll work, stove plate, malleable iron and semi-steel it is necessary to calculate the effect of various other metalloids, as phosphorus, manganese and carbon.

As previously mentioned and stated in our specification for "Foundry Castings," all mixtures are made according to analysis, and if care be taken in weighing the pig, scrap, coke, etc., the resultant castings are all that could be asked for.

We find that with phosphorus and manganese not above our specification it is necessary only to pay attention to the two metalloids, silicon and sulphur in common gray iron work.

In regard to silicon, we are compelled to vary the percentage according to the class of work; thus, for small pulleys and thin pieces we aim to keep the silicon between 2.25 and 2.85 per cent, for the reason that the iron must be fluid enough to fill every part of the mold, and the castings be soft when cold; furthermore, high silicon reduces shrinkage, a feature which must not be lost sight of in the work which cools very rapidly.

In steam cylinders, etc., where a close grained and medium hard iron is wanted, the silicon content is reduced and generally figured at 1.30 to 1.90 per cent.

It must, however, be remembered that the sulphur and other metalloids greatly affect the influence of silicon, and we shall devote an entire chapter to the influence of the individual metalloids and the cause of chemical and physical defects in castings.

Our method of mixing by analysis is quite simple and the results for the past five years are more than satisfactory.

It is an established fact, or rather a fixed law of nature, that a mixture of iron composed of two or more parts by weights, (i. e., pounds, tons, or per cent), will have a given composition and each part be proportional to the different metalloids present.

For illustration, suppose that we mix one pound of iron containing 3.00 per cent of

silicon, with one pound of iron containing 2.00 per cent of silicon; the resultant mixture will weigh two pounds, have a total silicon content of five per cent or be equivalent to 2.50 per cent of silicon in each part or pound.

This is the theory of mixing by analysis, but in actual experience it has been found that there is always a loss in silicon, due to combustion and other natural causes; a gain in sulphur from the fuel; a loss in manganese by oxidation; no change in phosphorus, unless the fuel contains this element, or the lining of the furnce is of a basic character, as will be noted in a future chapter; and a change in the carbons, due to heat conditions.

Therefore in calculating a mixture we must allow for the loss of silicon and the gain in sulphur.

The loss of silicon has been found by experience to range from 0.15 to 0.25 per cent; the general average for a sixty inch cupola is close to 0.20 per cent.

The gain in sulphur is due to the amount of this element in the coke, and will be from three to five per cent of the coke sulphur, much depending on the length of time the molten iron is in contact with the fuel.

For all practical purposes it is customary to make an allowance of four per cent; thus, if the sulphur content of the coke is 0.75 per cent, the amount added to the iron will be 0.03 per cent.

Most foundrymen use the above figure without regard to the amount of sulphur in the coke, taking it for granted that the coke will generally contain from 0.65 to 0.95 per cent of sulphur.

In our foundry work we analyze every car of coke and always use the four per cent increase; thus, for a coke containing 0.90 per cent of sulphur, we add 0.036 per cent to the estimate.

The loss on manganese in a cupola will vary from 0.20 to 0.30 per cent, with an average of 0.25 per cent, a figure which will be close enough for actual practice.

In the calculation or estimate of phosphorus in cupola mixtures, we make no correction for gain or loss.

The carbons are somewhat of a complex problem and will be explained later on.

Very little attention has been paid to carbon, whereas it is one of the most important metalloids and has more to do with the strength, hardness and other physical properties of the iron than all the other metalloids combined.

CALCULATING A CUPOLA MIXTURE.

If the foundryman has a record of the various irons in the yard and knows the sulphur content of his coke, he will be in position to figure out a mixture suitable for any class of work.

There are two methods used in calculating a mixture, one of which is to figure the number of pounds, the other to figure according to the per cent of iron used.

Both methods give similar results, consequently it is immaterial which one we use.

As an example, we will suppose that in a "charge" of 3,000 lbs. we have the following mixture, viz.: 50 per cent of pig, 30 per cent of "home scrap" and 20 per cent of "foreign scrap."

We know from previous analyses the amount of silicon and sulphur in our pig iron and in the home scrap, therefore the only "unknown quantity" will be the silicon and sulphur in the foreign scrap.

An experienced foundryman can closely approximate these two metalloids in foreign scrap by the appearance; thus, if the scrap consist of small thin pieces, it is reasonable to expect the silicon to be between 2.00 and 2.40 per cent; if the scrap consists of large pieces, then we may assume the silicon to range from 1.50 to 2.00 per cent.

Of course this part is only a surmise as to the true analytical composition, and we are obliged to take these assured figures until after we have made a few mixtures and found by analysis the actual composition of the castings, after which the scrap may be estimated by difference.

We will, however, assume that the composition of the iron and scrap is the same as shown in the two following examples, where one is figured according to the number of pounds and the other according to the per cent of material used:

ESTIMATING THE SILICON.

Brand of Pig Iron.	Grade or Number.	Amount Used, Pounds.	Per Cent of Silicon.	Total Points of Silicon.
Clifton	No. 1	900	× 3.10	= 2790.00
Stirling Scotch	No. 2	450	× 2.20	= 990.00
Sidney	No. 3	150	× 1.60	= 240.00
Home scrap (sprues, etc.)		900	× 2.20	= 1980.00
Foreign scrap		600	× 2.00	= 1200.00
		3000		7200.00

Dividing 7200 points of silicon by 3000 lbs. we get 2.40 per cent.

Subtracting the usual "loss," 0.20 per cent, from this, we have 2.20 per cent of silicon in the castings.

Taking the same irons and figuring according to per cent, we will obtain the same result, but in slightly different manner, as follows:

Brand of Pig Iron.	Grade or Number.	Per Cent Used.	Silicon Content.	Per Cent. Total Silicon in 100 parts.
Clifton	No. 1	30	×3.10	= 93.00
Stirling Scotch	No. 2	15	×2.20	= 33.00
Sidney	No. 3	5	×1.60	= 8.00
Home scrap		30	×2.20	= 66.00
Foreign scrap		20	×2.00	= 40.00
		100 parts		=240.00

One part will equal..... 2.40 per cent.
Subtracting "loss"..... .20 per cent.
Silicon in castings equals 2.20 per cent.

Sulphur is figured in exactly the same way, except that we add to the final result the per cent of gain or increase due to the fuel.

In estimating the sulphur it is customary to figure the sulphur in all foreign scrap at 0.10 per cent

(Note: Silicon is generally figured to the second decimal place; sulphur and phosphorus to the third place; magnanese and carbon to two places the same as silicon.)

ESTIMATING THE SULPHUR.

Brand of Pig Iron.	Grade or Number.	Per Cent Used.	Sulphur Content	Per Cent. Total Sulphur in 100 parts.
Clifton	No. 1	30	×0.013	=0.390
Stirling Scotch	No. 2	15	× .024	= .360
Sidney	No. 3	5	× .033	= .165
Home scrap		30	× .081	=2.430
Foreign scrap		20	× .100	=2.000
		100 parts		—5.345

One part will equal.....0.053 per cent.
Adding "gain" for coke..... .030 per cent.

Sulphur in castings equal.. .083 per cent.

It is obvious that in order to reduce the sulphur in the castings we would have to use a large amount of low sulphur pig, or a smaller amount of scrap; hence, in case of high sulphur in the castings, decrease the amount of scrap in the future mixtures, in this way it is possible to lower the sulphur content in the next heat.

We have endeavored to explain the method of figuring or calculating the silicon and sulphur in a cupola mixture and hope that we have not neglected any important points in the modus operandi.

In every day practical work, every foundry has or should have a ruled and printed form, called a "mixing card," on which is recorded the amount of coke, limestone, home or domestic scrap, foreign scrap, steel scrap, and the various grades of pig iron, used in the mixture.

The foundryman usually knows before hand how much iron he will melt, also the different kind of castings required for the next day's work, consequently the mixing card is made up the day before and the cupola tenders have it in readiness the next morning.

We will suppose that our floor space will accommodate a melt of 40 tons, and that we require three different grades of iron, as for instance a close grained iron for steam cylinders, hard iron for bed plates, frames, etc., and a soft iron for pulleys and thin castings.

All of these irons are to be melted in the cupola and the different grades kept separate, a very easy matter when mixing by analysis.

In order to explain the method we will first make out a mixing card and present it to the reader as an exact copy of an actual mix made in our works.

(TO BE CONTINUED.)

Answers to a Couple of Inquiries.

In the November issue of THE FOUNDRY, "Inquirer" asks a couple of questions in regard to the strain of the mold when being filled with liquid metal.

As I understand the question, the rims are to be made thicker on the inside, so as to have all the wheels 48 inches in diameter on the outside. If my idea of this is right, the lifting strain on the cope will be as follows: Let the strain caused by the 1-inch rim equal "1"; then the strain on the 6-inch rim will equal 5.4 nearly, and on the 12-inch rim it will be equal to 11.3, or respectively 5.4 and 11.3 times the

first. The strain on the bottom, and also the pressure on the mold sideways, would be equal in all three cases.

If the molders who ask the question on page 166 of the December issue of THE FOUNDRY will observe a circular plate of steel, as, for instance, a saw revolving on an arbor that has become heated from friction so as to heat the plate to any extent, they will notice that while the central portion of the plate is continually becoming hotter, the rapidly moving rim will remain cold. The result will be that the center will expand while the rim will remain the same as if the center had not been heated. Consequently the plate will take a concave form to accommodate the expansion in the center. In the case of the casting referred to, all of this is reversed, and the outside is contracted to cause the chill surface to become concave.

My theory is this, the metal that lies on the chill becomes sufficiently cooled, as soon as it strikes the chill to set that part of the casting, while the balance of the metal is yet in a liquid state. From this it appears to me that when the latter portion of the casting begins to cool, the contraction will draw the chill portion in at its outer circumference and cause the center to hump up, or become concave, as is shown in the illustration. If the mold was turned up on edge, so that the chill would lie against one side of the casting, I have no doubt but that the concave portion would be eccentric to the form of the face of the chill; or, in other words, the highest portion of the concave part will be at one side of the center and always on the one which was uppermost in the mold.

As a remedy I would suggest that the metal be poured into the mold with as high a head as is possible. This, I think, will have a tendency to make the chilled portion of the casting flat, although it may not accomplish this as perfectly as desired. This is the only remedy which I can think of, as, if the surface of the chill was made concave, it is my opinion that the casting would go the other way, and the chilled surface would consequently be more convex than the chill was concave.

I have not had an opportunity to test this theory, and if any one should be enough interested in the question to carry it out, I should like to learn the results obtained. F. A. B.

When it comes to making mistakes a man never reaches the age limit.

Mexico and its Foundries.

Scattered over the Republic of Mexico are about twenty iron foundries of various sizes, few of them employing more than eight molders, and many only one or two, and some of them only an occasional man.

The appliances are crude, and foundry supplies scarce, and in some parts unknown, except in the four railroad foundries, where some modern appliances are in use, and good foundry supplies from the U. S. are constantly on hand, in such shops it is needless to say, the output is larger per man, and of a better quality.

Green sand is principally employed, although Mexico City, Durango and Chihuahua make a number of dry-sand castings. Some loam work has been made, but only in the shop I superintend. As the foundry business is only in its infancy in this country, we have nothing in the form of antiquity except an old iron works near Durango, which is quite similar to the old rock furnaces built in the South during war times.

Although there are some extensive iron mines, and at Durango great mountains of it, capital has held off until quite recently, and they have not been developed. The iron consumed has to be imported from foreign countries at a high price. Number 2 soft foundry costs at the border $47.75 per ton, and other grades proportionately. As a consequence, scrap iron is in demand, and in many shops remelted without the addition of any pig iron, causing hard castings, but everything goes here, and the machine shop has to suffer. The price of castings, however, helps to make the heart light and the bank account heavy, which explains the constantly increasing number entering the business. Fifteen cents per kilogram is the common price for machinery repairs, molded from patterns, and delivered foundry finish.

Americans virtually own the foundry business of the country, and up to five years ago American molders made the castings, but the majority were such disreputable characters, and besotted wretches, that it became necessary to utilize the native labor, which has been so successfully carried out, until to-day there is not ten foreign molders in the whole Republic.

The wages for foreigners ranges from $5.00 to $5.50, and native from $1.00 to $4.50 per day of ten hours. Common labor ranges from 40 cents to $1.00 per day. An erroneous opinion is generally expressed regarding the intelli-

gence and ability of the native in manufacturing enterprises, and I can positively state that from my five years' experience with them that they are endowed with all the faculties of an American or any other nationality occupying a similar station in life, quick to learn, slow to forget, and prompt in obeying orders are some of their good qualities. To-day can be seen natives making locomotive castings, doing the machine work to them, and placing them in position, and on some roads handling the throttle and safely carrying the commerce of the country from point to point.

Foreigners are nearly always in charge, and direct the actions of the natives, and this may be necessary for years, as the older men do not seem to grasp the idea of originality, or solving mechanical problems, but when the native children that are now attending the excellent public schools, become men, it would not be surprising if a new era were to dawn in the land of the Montezumas.

All wages are paid in silver which, at present, is worth 50 cents in gold, and as a consequence the foreigner does not make as much money as is usually made in the United States, because he has to consume imported goods which are expensive on account of duties. The natives on the other hand can purchase all his necessaries and many of the luxuries of the country with his wages.

The great enemy of both native and foreigner is the intoxicating drink of the country. It is so cheap that six cents will purchase enough to make the feet drunk and the brain that of a maniac. The better class are dignified, yet courteous people at all times, and when sober the lowest class are inoffensive and polite, and the foreigner that has enough respect for his own country, to cause him to respect another nation's laws, has nothing to fear in Mexico.

S. D. BEACH.

Cindad Porfirio Diaz, Mexico.

Machine Molding.

A very interesting discussion took place at a recent meeting of the Pittsburg Foundrymen's Association on the paper of E. H. Mumford, on "The Problem of Machine Molding," published in the October issue of THE FOUNDRY. In his paper Mr. Mumford took up the subject of molding machines and argued that they were bound to come in for much wider use in the future, despite the attitude of the organized molders, which has been unfavorable.

In inviting a discussion of the paper the president, Dr. Moldenke, said that there were several ideas in each paragraph of the paper, containing many points that furnished fit subjects for discussion and elaboration. The thought was new that on account of the ease with which duplicate castings could be made there would be a greater demand for the difficult castings which could be made only by hand. He thought the present outlook made the molding machines a necessity, and inquired if anyone present had any information in regard to machines for making cores.

Mr. Fischer stated that he had lately introduced two molding machines, and found that the great difficulty in using unskilled labor with them was the difficulty in pouring off. It was not hard to teach the unskilled men to operate the machines quite successfully, but when it came to pouring off there was likely to be more or less trouble, as the operation requires considerable skill. It was suggested at this point that some one in the foundry be especially trained to pour off, instead of expecting the unskilled men who operated the machines to pour off. It was held that it would take several weeks to teach men to pour off, there being many tricks in the trade. In Mr. Fischer's foundry the work was especially difficult, as the castings were small ones for meters, being only $\frac{1}{8}$" thick in some places, yet required to stand a pressure of 100 pounds. If the pouring is not done right, the castings have strains or will not bear the pressure. He now has one skilled molder, a helper and a boy to core, the skilled molder being required for the pouring. The trouble with the regular molders is that they do not want to pour off another man's work. When there are men engaged on hand work, who are called off from their regular work to pour for the machine product, they have no sympathy with the machine and do not do the best work, the result being strained castings frequently. But Mr. Fischer stated that there was no comparison between the machine and hand work, the machine doing four times as much as could be done by hand, and the work being done much better. He had used a machine which rammed the mold through a jarring mechanism, but had abandoned this feature for hand ramming.

Mr. Sleeth suggested that the strains produced by unskilled pouring might be largely obviated by introducing another gate. It was stated that skimmers had been introduced

with success to avoid the men spoiling the work.

A foundryman stated that he had had considerable trouble when he first introduced the machine, the great trouble being the pouring off. He had from 250 to 275 molds to be poured from 30-pound hand ladles. He had found great difficulty in trying to break in new men to pour. They got iron into their shoes and had all kinds of trouble. Now he presses into the pouring service all the molders and coremakers in the shop.

It was pointed out that the matter of pouring was a problem which should be attacked in a regular manner. Nearly every mold is poured differently, and a new man must learn all the tricks before he can do all classes of work properly. It is better to employ good men with the machines, who would be cheaper in the long run. With green men there would be so much loss that the advantage of the machine would be wiped out. The experience of one member was that it took about six months to break a man in to pour some given class of work, and by training several to different classes, a foundryman is prepared for all ordinary kinds of work. The opinion expressed was that the true field of the molding machine was simply to relieve the brains of the hard work attendant with hand molding.

Mr. Sleeth stated that in his work he was breaking in new men all the time, and as opportunity afforded he started them first on the easier jobs. In regard to getting the experienced molders to pour off, it was pointed out that frequently a machine would in a day do work which would require a molder two months to do by hand. It was rather difficult to persuade a good molder that the introduction of such a machine was for his benefit, hence if he is called upon to pour off such a lot of work he is likely to object and in any case will not do the best work. It was found in one instance that the loss is about the same with machine as with hand molding. With hand molding the men do not always pour properly either.

A point was made with reference to the pouring of white iron, in malleable work. It was difficult to get men accustomed to pour gray iron to handle the white iron properly, because the latter is of a dazzling whiteness, like steel, when of no higher temperature than gray iron, and it took some time to get the men used to this different appearance.

It seemed to be the general opinion that the claims advanced by the manufacturers of molding machines were too high, and it was suggested in some cases that they hurt their own business, as prospective buyers were frightened off when they learned, as in some cases cited, that the whole product of the shop for a year could be molded by machine in three days. There would not, of course, be cupola capacity sufficient to handle the work so rapidly. Then, again, the big claims made for the machines induced the purchasers to push them too hard, with the result that they would not work right. A case was mentioned where the speaker knew that a molding machine which was thrown into the cupola was really a good machine, for a reasonable and perfectly satisfactory amount of work, but had failed to come up to the exaggerated claims made for it by the seller. It was a good machine, but not nearly so good as had been claimed. An illustration of this principle was cited in the case of an Altoona shop where some iron was purchased to be of a certain analysis and grade. The blast furnace for the first shipment sent a carload which was far above the requirements. The second car was well within the limits, but was so much poorer than the first shipment that the purchaser thought something was wrong and rejected the whole shipment.

In connection with the claims of the molding machine manufacturers there was some criticism as to the variety of work capable of being made. When there are a large number of the same piece to be cast the molding machine shows its greatest efficiency. Then there are classes of work to which it is well suited, and other kinds of work, more difficult, to which it is not so well suited. Its value varies for different kinds of work, and the opinion was that the cause of the molding machine has been injured by claims made that it could do all kinds of work and do each kind much better than by hand. This led to skepticism as to the whole subject on the part of foundrymen.

A particularly rapid machine was mentioned, which was the invention of a Cleveland man, and operated somewhat on the principle of the turret lathe. This machine would make about 3,000 molds a day, which was an enormous output, and more than the regular molding machine would do, but the difficulty was that the machine operated s

fast that it was impossible to see into the molds as they were made, and all that came from the machine had to be poured. Many of them were defective, resulting in defective castings which to be thrown out, and the loss from these was so great that the machine had to abandoned. Had it worked slower, and in such a way that the molds could be examined, the great loss of castings would be prevented, and this would have much more than have made up for the slightly greater cost of molding owing to the slower operation.

Some Criticisms.

BY THOS. D. WEST.

In the September number, page 11, a sentence about the middle of the first paragraph says: "Under this impression, cupolas have been especially designed for mixing irons, by collecting a large body of molten iron in the cupola before tapping." The tenor of the matter following this statement is such as to lead a novice to believe that there is much difficulty experienced in having metal mix well in cupolas, so as to require stirring, etc., after being tapped before pouring molds..

In my broad experience of nearly 40 years in making heavy castings, where large bodies of metal are required, I have yet to find an instance where trouble was experienced due to ill-mixing of metals without stirring. A difficulty that founders often find, lies in metals mixing too well. As an illustration, take the case of melting down different grades of iron in one heat, where a soft mixture or charge of iron may be on top of a hard one, or vice versa. Here the founder would be very glad if different grades would not mix at all, so that he could tap out one and stop up when the other made its appearance, but instead, he finds that if the least weight of the upper charge of different iron melts down to mix with the lower one, that he does not get the grade of iron in his casting he desires.

I never knew of a practical founder ordering high tuyeres especially for the purpose of mixing iron, as alluded to in the sentence herein criticised. High tuyeres are used for the purpose of assisting cupolas to run long heats, or for the purpose of collecting bodies of metal to await the convenient return of pouring crews or crane ladles, instead of using stand ladles or reservoirs.

In Cast Iron Notes, page 32, September number, it says, "The scrap from the day before has less carbon than the pig." "If the pig mixture gave 3.25 carbon, the scrap would have been near 3.00 per cent." This means that about one-quarter of 1 per cent. of the carbon was burned out in remelting the iron. This I have found wrong. Instead of decreasing the carbon, I have discovered that we increase it as long as the iron does not possess more carbon than it can absorb. In some experiments which I made on this subject about two years ago, I discovered that the carbon was increased in four melts from 3.94 to 4.76, an increase of nearly 1 per cent. It is natural to expect this, as the carbon iron possesses is obtained from the fuel used to make the iron. There is no reason why, in remelting iron, if it has such an affinity for the carbon in fuel, while it is being made, that it should not possess something of a similar affinity while being remelted.

SAMPLES OF PIG IRON DIFFERING IN HARDNESS UNDER TEST, BUT MAKING CASTINGS OF LIKE SOFTNESS.

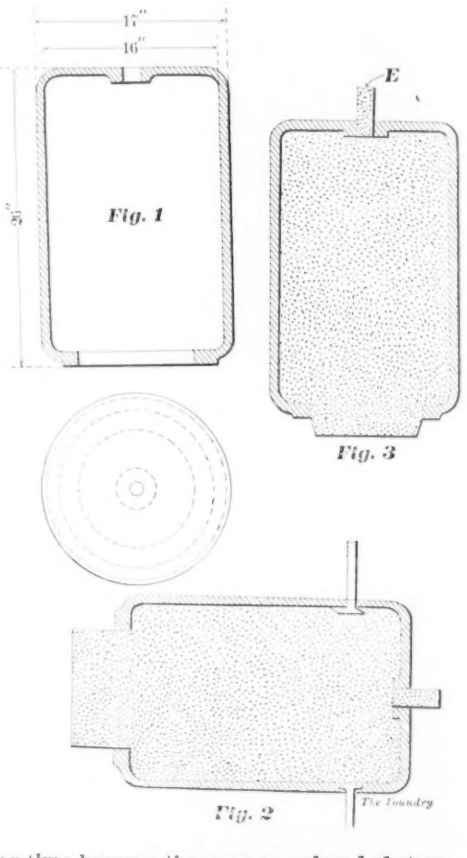
The article on "Hot Iron," page 46 of October number, implies that iron should not only be melted "Hot," but poured hot and rapid, for all kinds of work. All molders or founders of any experience, in making medium and heavy castings, know that the success of getting many castings smooth, and solid also, free of scabs, which make dirty castings and blow holes, greatly depends upon the temperature of the metal and the speed of pouring. I make this statement merely to correct the evil or losses that the practice advised under the head of "Hot Iron" can cause novices in founding, did they attempt to practice them. The novice who will accept the fact that there are certain temperature and speeds in pouring that are advisable in obtaining the best success with many kinds of castings, will be on a better road to discover and remedy any trouble he may have, than one who would continue to follow the precepts contrary to this, as given under the head of "Hot Iron."

Under Cast Iron Notes, December Number, page 156, a machine is advanced as being practical for telling the grade of softness in castings that pig iron will make by testing its hardness with a drill, arranged to sensitively record any difference in degrees of hardness. If it were practical to tell what grades of softness would be obtained in castings by a hardness test of pig iron, there would never have been the need of furnaces or foundries fitting up laboratories to analyze pig iron, as they have done by reason of having learned in recent years that the fracture of pig iron is often deceptive, and which is no more or less than being guided by hardness.

To demonstrate my position, I will agree to send anyone two samples of pig iron of practically the same size and analyses, excepting combined carbons that had been poured in sand molds, by their paying the cost, which will not exceed $1.00. One piece of these samples will be found so hard as to take as long again to drill it as the other, if not longer, still for all this they will give like softness in like castings. To demonstrate this our illustration shows views of two samples of pig iron, of practically the same iron and analyses, cast in sand molds, No. 1, of which took eight minutes to drill it, and the other twenty-two minutes, a difference of fourteen minutes. No. 3 shows the plan of drilling, and both pieces were drilled under like methods and conditions. Although Nos. 1 and 2 show such a great difference in their hardness, they would, if melted separately, under like conditions, give like softness in like castings. It seems a shame that at this day of advancement in defining the grade of pig metal, one should be called upon to demonstrate the impracticability of being guided by the old and deceptive plan of hardness tests to judge the grade of iron or softness which pig iron would produce. Nevertheless, I will not sit by and see uninformed founders misled into adopting an impractical system without making a protest.

Some Features of Shop Management.

In a great many foundries the cry is current that "our castings cost too much." Of course those people do not wish to get castings for nothing, but they would like to have their molders take more interest, move a little quicker, and not lose so many castings. If those people saw a railroad engineer los-



ing time because the manager placed obstructions on the track they might conclude that the man who occupied that position might be fit for something, but certainly not for that

one. They would with one accord exclaim, "Remove those ties! Give that engineer a reasonable chance."

Conditions as rediculous are being continually imposed upon the molder by the very ones who are eternally urging him to move faster. The capacity of a man is limited under certain conditions as well as that of the locomotive, and all the energy expended in passing obstructions is lost.

Those people who possess the simple qualities of a cashier would readily see this in regard to the locomotive, but when they look at the molder energetically trying to "make time" they generally come to the conclusion that the molder's "lost time" is entirely due to his torturing lack of energy.

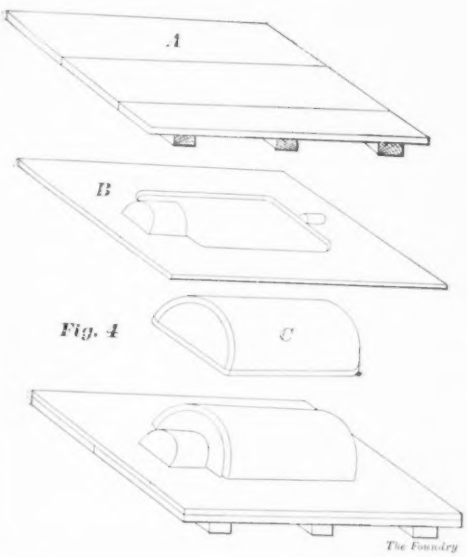


Fig. 4

Few people indeed consider how little the molder can vary from the conditions imposed upon him by the blindness of his manager. Who has not seen molders attempt to depart from the good old custom which they could plainly see was the origin of delay, and so-called "bad luck," when presently the "writing on the wall" would indicate their finish.

If people who pay for castings ever get to know that the nearer castings come to the size wanted the cheaper they are, those yawps who know little more than to berate the molder will soon be relegated to the station in life nature intended them to occupy, and the molder will be given an ideal to strive for and a clean track to get there on.

Observation in many foundries will reveal conditions which are productive of loss for which the molder is sure to get a full measure of blame, and that on simple castings indeed.

With a few sketches I will give an idea of making a simple casting which has for years been a "thorn in the side" of one of the large foundries.

Fig. 1 is the desired casting; Fig. 2 shows the good old way of making it. The metal is not equal above and below the core; this is the result of the chaplets sinking into the core, which would happen on about fifty per cent. of these castings, many having no thickness at all on top. Fig. 3 shows how the casting should be made without risk or waste of chaplets and time. The slight lift on the core in this position is easily taken care of at c.

In Fig. 4 I will give an idea of the new manager's method of making the same casting. A, B and C are the separate parts of the "machine." Sagacious men will readily discern its drift, and the mechanic will see that it is an aimless dash at the match and striping-plate combined with all the risks and traditions of old retained. This "machine" requires the expenditure of more energy to produce the casting than the old way. When operated strictly as a machine the loss of castings was 100 per cent. exactly. Until foundry managers gain a realizing sense of their business the blame will be shifted from the man of higher intellect to the molder, and the cry of "castings cost too much" will be heard.

HENRY O'NEIL.

Early Days in Mine-opolis.

At the Mine-opolis Foundry and Machine Company's plant the main engine was a remodeled fly-wheel steam-pump, cylinder about eght inches bore and six inches stroke. The connecting rod was bifurcated to straddle the water cylinder. The remodeling consisted in throwing away the water cylinder and placing a plain bracket in its place, to support and guide the piston rod. This up-to-date prime mover was one result of the Old Man's trading proclivities. He traded the old engine, a good 9x12 plain slide-valve engine, amply powerful for its work, for the said steam pump and some money, saying that the 9x12 engine was bigger than was necessary, therefore wasteful. Now, thought the O. M., we'll get better economy. The cupola, about 42 inches in diameter, was

blown by about a No. 5 fan blower, and when the remodeled engine began to blow the first heat, 100 pounds steam pressure, all he dared give the old boiler, would give only about one-half the necessary engine speed. Something had to be done at once. Mike, the foundry foreman, entered the motive power department with remarks not adapted for publication, and the O. M. shouted: "Throw off the machine shop belt." The chief engineer, who did considerable business at the drill press and made himself generally useful, at once shut her down and worked off the main belt. The O. M. meanwhile had thrown off the governor belt. Thus relieved, the F. W. S. P. engine, which was belted direct to the blower, got up a fair speed, when the throttle was wide open. "Well, boys," said the O. M. to the machinists, "you'd better go into the foundry and help them off with the heat. You see," said he to the machine shop foreman, "we have to have several of them to help off the heat, anyway, and if we have plenty of help we'll not lose so many castings." So thenceforward the machine shop suspended business when the foundry began melting.

Sam Better had some interesting experiences in the Mine-opolis foundry. Mike, the foreman, was a great man for getting up a big day's work and then losing about 50 per cent of it through poorly anchored cores, flasks not clamped, poured short, etc. Scabs, blowholes, swells, broken cores and various deformities were leading characteristics of his work. A visitor from a well-ordered foundry would have thought this one a pandemonium at casting time. At the beginning of the heat Sam usually "tapped out" the cupola into the 800-pound ladle and poured from that into the shank ladles. About the time the first heavy casting was nearly poured, Mike, who had been commcommanding at the top of a high-keyed voice: "Light that vent; pull off that stopper; pour in, there; *pour in! pour in!* keep that runner full; somebody bring some clay, *quick*," would rise to a grand climax and deliver an ear-splitting yell: "*Sam, tap out a little iron, quick!*" The sequel to this remark was usually a cold short casting.

Adam, the melter, had a habit of making the stopping clay and the cupola breast very wet, and as a result Sam decorated himself with burns from the spluttering iron when stopping the tapping hole. On one occasion the breast, being made too soft, caved in entirely with the pressure of the tapping bar and resulted in spreading half a ton of iron all over the cupola room; scorching the soil of Sam's future whiskers, causing a general sociable time for all hands and delaying the heat half an hour or more. After this occurrence Sam reasoned with Adam and induced him to mix the clay drier, which ended the trouble. As soon as the iron was all charged Adam usually came down and tapped out while Sam poured off sash weights—one or two dozen flasks. The molders were nearly played out by this time. On cold winter nights the steam, core smoke and gas were often so thick it was impossible to see a big oil torch ten feet away. The sash-weight flasks, for want of room, were put in rows so close together that the handles lapped, and walking between these handles and pouring with a heavy shank ladle in the dark was not unmingled felicity. Spilling a few pounds of iron for a light to show the gate was a regular practice. A number of flasks were usually piled on top of the others, and after the lower ones were poured, the men walked on them while pouring the upper ones. Occasionally a molder would be overcome by the gas and have to be helped out into fresh air. On one occasion the O. M. was carried out insensible. After the heat was over nearly all the work had to be shaken out, and the flasks, all of wood, piled up.

Eliphalet Cork, the chief engineer and all 'round mechanic of three months' practical experience, noticed one day that something more than usual was wrong with his F. W. S. P. engine, and sought advice from Vine, an experienced machinist. "There's 90 degrees of steam on that there steam clock," said Cork, "but she's running awful slow. Somethin's wrong." Vine was not averse to a little joke at the C. E's expense, so he at once explained: "Your steam pipe is stopped up; there's something stuck in it. Take that scantling and pound on it; that'll loosen it up and it'll blow through." Eliphalet thankfully adopted this wise counsel, while Vine quietly invited one or two other machinists to note the result and join the laugh. Vine's jaw almost fell off when he saw the engine jump up to speed at the first lick. The governor stem, badly worn and tightly packed, had stuck down, and the slight jar was all that was necessary to loosen it and give the engine steam. Vine has never mentioned the incident since, and

the C. E. will believe till doomsday that he loosened the obstruction and blew it out through the exhaust.—The Judge, in American Machinist.

American vs. British Pig Iron Making.

The London Times in a series of special articles devoted to the American iron and steel industries, has this to say regarding American methods in blast furnace management:

Speaking generally the practice of American blast furnace managers is to force the production much more than we do in Great Britain. That, of course, is facilitated by the richer ore; for if there is one ore, say, 60 per cent of iron and 40 per cent of gangue, which is slag-making material refuse, it stands to reason that the furnaces will make considerably more iron in given time than if 60 per cent of the ore is gangue and 40 per cent only is iron. In each case the whole mass has to be brought to a molten state, and the larger the percentage of impurity the more coke is burnt for a given product of iron. That accounts to a large extent for the extremely high product of American furnaces as compared to our own. Beyond this, however, the Americans make a deliberate practice of driving their furnaces, as they expressly put it, "for all they are worth." In order to smelt iron-stone the ore, the coke and the limestone used for flux are charged into the top of the furnace. The coke burns, the iron melts out from the ore, and the waste matter combines with the limestone to form the product known as slag.

What is the exact nature of the chemical reactions needed to produce the conversion is matter of controversy between authorities; but to get the necessary heat for these reactions a strong blast of air must be sent through the furnace. In order to produce this blast-blowing engines of enormous power are used, the air being forced in at the bottom of the furnace through tuyeres, or short iron pipes, which are kept from melting by having a water circulation. The Duquesne engines (Carnegie Works), of which there are ten, are 40 feet high. They have cylinders up to 100 inches in diameter. Each is equal to the power that can be exerted by 1,800 horses, and each will deliver 50,000 cubic feet of air per minute. The pressure of the blast is equal to 15 to 18 pounds on the square inch, and it is raised, by means of enormous stoves using the waste gases from the furnaces, to a temperature of 2,000 degrees Fahr. The working of a blast furnace never stops. Year after year, from the time it is first lit or "blown in," there passes down its fire brick "throat" this constant stream of ore, coke and flux; a thousand tons a day. The red-hot breath from the blowing engine rushes upwards and meets the molten stream without ceasing, until at last the mighty digestion is worn out, after gorging perhaps a million tons, and the furnace is blown out for a new lining.

The economics of the blast furnace depend largely on how long it will take to bring a lining to the condition of being too thin to work, and in this respect the practice of British and American ironmasters differs materially. The largest Middlebrough furnaces have a capacity of 36,000 cubic feet, which is, it will be seen, considerably above the content of the Duquesne furnaces. But the English furnaces only produce 950 tons of Cleveland pig iron a week per furnace, as against the 4,200 tons a week. The hard driving to which Americans resort, as might be expected, means a short life to the furnace. I did not hear how often the Duquesne furnaces are relined, but Archibald P. Head, an English engineer, who has paid considerable attention to the iron and steel practice of both England and America, gives some figures as typical. He says the lining of an American furnace, working, however, at lower blast pressure than the Duquesne furnaces, lasts four years; in one case the lining of a British furnace lasted eighteen years.

The Americans, however, do not estimate so much on the time a furnace lining will last as on the iron it will produce, and that undoubtedly is the more rational mode of calculation. "We hold," they say, "that a lining is good for so much pig, and the sooner it makes it the better." In the case quoted by Mr. Head, however, the American four-year furnace only produces 270,000 tons of pig, while the English furnace passed out 500,000 tons of iron from a lean ore. In spite of this greater cost of lining per ton of iron produced of the American practice (and it is a very costly business to line a furnace) the ironmasters of the United States believe in hard driving. They want to make plenty of iron to keep their mills going and look on it that a little loss in fur-

nace lining is more than repaid by savings in other respects. The policy may be open to question, and, as Mr. Head suggests, the striving after large outputs may be due rather to rivalry between furnace managers than to considerations of economy. Still, the Americans have their great success to point to as their justification.

As to the advantage of another characteristic feature of American blast furnace practice there can be little question. Nothing seemed to be more notable at the Duquesne works than their loneliness. Had it not been for the subdued hum, characteristic of a furnace in blast, and the rush of waste water from the tuyeres, one might have thought the works were shut down. This is seen, more or less, throughout the United States, where great effort is made in all productive industries towards replacement of human labor by mechanical appliances—From the humblest kitchen to the mammoth factory—from peeling apples or washing plates to heaping tons of coke and ore into a blast furnace—the American always strives to do what he can by machinery, and the inevitable consequences are that labor is better paid and that there is more demand for it than in any other country. "For anything that can be done without thinking we want to use a machine, so that men can be set free to work the best part of them, their brain." That is the position taken by the American. It is this that chiefly accounts for the apparent anomaly of high wages and cheap labor —that is, cheap in terms of the product.

To a large extent the Americans have been forced by circumstances into new departures and improved methods, by geographical considerations and the exigencies of their position. None the less, credit is due to them, and it is credit that no fair minded Englishman will withhold. The ingenuity they have displayed and the courage they have shown in tackling difficulties during the uphill fight in putting their steel industry on a footing to compete with our own in neutral markets is worthy of all praise and admiration.

The Fracture of Pig Iron.

It has been the practice of foundrymen and blast furnace men, for many years, and we might say ever since pig iron was first produced from a blast furnace, to judge and grade the iron by the fracture of a freshly broken pig. This practice of grading iron is now being rapidly replaced by grading from chemical analysis, which will no doubt prove more accurate to the majority of foundrymen. Yet a practice that has been in vogue for so many years must have some merit, and a few points from the old school may be of value to the foundry chemist, as well as to foundrymen.

The characteristics of pig iron are as accurately indicated by the fracture, to the man who has acquired the art of judging iron by fracture, as they are by chemical analysis. This may seem a radical statement to the strong advocates of chemical analysis, but it is none the less correct. There are many castings in existence to-day, made many years ago, for which the iron was chosen by fracture, that are in no way inferior to those made by chemical analysis, and in many cases superior to them. There are foundrymen to-day to whom the fracture indicates as accurately the characteristics of an iron as does a chemical analysis. The uncertainty of judging irons by fracture comes not from the fracture nôt accurately indicating the characteristics of the iron, but from the foundryman not being able to judge its characteristics; in fact, the foundrymen have given the matter of fracture sufficient attention to become fracture experts.

Among those whom the writer has met who may be classed as fracture experts, was Frank Lawrence, for many years foreman of the American Stove & Hollow Ware Co.'s foundry, and for more than twenty years, and up to the date of his death a few years ago, the iron and cupola expert of the Isaac A. Shepherd Stove Works, Philadelphia, Pa. Mr. Lawrence could look at and feel the fresh fracture of a pig and say accurately whether it would or would not make a soft, strong stove plate. And he could determine in the same way, whether two or more irons when melted together would produce a soft, strong plate, and was never known to fail when left to use his own judgment of irons. He was one of the first foundrymen to use high silicon, or silver-gray iron, as it was then called, in a stove plate mixture, and melted many tons of it, when other founders condemned it as a worthless rotten iron.

Another expert of iron fracture is Thomas Magee, foreman of the Bushill Iron Works for many years and up to the time the works

were closed, to make room for the new United States mint now being built at Philadelphia. The specialty of this works was large rolls for rolling mills, and the success of the business which enabled the proprietor, Mr. Moore, to retire with a fortune was largely due to Mr. Magee's knowledge of iron fracture, which enabled him to turn out rolls of any required degree of softness, hardness and strength.

There are no doubt many other fracture experts employed in the various foundries throughout the country. They will generally be found in foundries making a specialty that requires a good quality of iron. The writer has met with some success in judging irons in this way, although by no means an expert, and many old foundrymen in different parts of the country will remember that he melted in their foundries iron which had been condemned and had lain in the yard for years. One of the successes in this line was at the Union Stove Works, Peekskill, N. Y., in 1876, when a large lot of iron which had been condemned and had lain in the foundry yards for five years or more, was melted with another iron, said to be inferior, and a good soft, strong iron for stove plate produced. Neither one of these irons had ever been seen or melted before by the writer, and the mixture was made from the indication of the fracture without previous knowledge of the characteristics of the iron. Other successes met with were at the foundries of Perry & Co., and Rathbone, Sard & Co., Albany, N. Y., in 1876. The irons used at these foundries at that time were Crane, Allentown, Thomas, Hudson and Jager. These irons, Nos. 1 and 2, had been used for years in the stove foundries in this locality and produced a soft, strong plate, but they had suddenly begun to run hard, while the fracture to all appearance indicated the same characteristics as when they ran soft. A mixture of these irons in various proportions produced an uneven, hard plate. The hardness was first attributed to one iron and then to another, which in turn were left out of the mixture, and finally to the No. 2, which was all left out, and at the foundry of Rathbone, Sard & Co. only No. 1 Crane, Allentown and Thomas were being used when the writer visited their foundry.

This mixture of No. 1 irons produced what the writer termed a sandwich iron, from the tendency of the hard iron to separate from the soft iron and form in a thin plate between two thin plates of soft iron. This frequently occurred over a large surface in plates not more than 3-16-inch in thickness. It would also separate from the soft iron in heavy parts, such as lugs, and one lug of a door or side might drill perfectly soft and free, and another drill free part way through, when a hard iron would be found that could not be penetrated with the drill.

This characteristic of this No. 1 iron was afterwards found to be due to an attempt by the blast furnacemen to reduce the cost of their product by using a cheap Jersey ore, the iron from which did not unite with the iron from other ores. To overcome this difficulty, it was suggested to Col. Young, the foundry superintendent, and a foundryman of many years' experience, that the fracture of the No. 2 iron indicated a softer and more even iron than the No. 1, and that a mixture of all No. 2 Crane, Allentown, Thomas and Jager be made. The Jager iron had been condemned and not used for some time, and the idea of making a mixture of this iron, the No. 1 of which was said to run hard, with all No. 2 of the other brands, which were also said to run hard, was too absurd to be seriously considered by the colonel. But after some success had been met with in melting Jager and No. 2 at the foundry of Perry & Co., the Colonel, not having improved on his mixture, was induced to try a charge of the above for grates and fire backs. This proved so satisfactory that an entire heat was melted from the mixture and a soft, strong, even plate produced.

Numerous other instances might be given of judging by fracture irons never seen before, but these are probably sufficient to show that the characteristics of iron are indicated accurately by the fresh fracture. Irons are generally judged by the color, size, shape, brightness, dullness, smoothness, sharpness and regularity of the crystals in the fractures of a newly broken pig. A dark color is said to indicate a soft iron; a light color a hard iron; a large crystal, a soft iron; a small crystal, a close or hard iron; a bright iron, a fluid iron; a dull crystal, a non-fluid iron; a smooth crystal, a weak iron; a sharp-pointed crystal, a strong iron, and an irregular crystal, an uneven iron that will run hard in spots.

The majority of foundrymen judge iron by these characteristics, and they can generally predict very accurately from them in irons to which they have become accus-

tomed, any change that may take place in the castings. But the majority of them cannot judge accurately irons, the fracture of which they are not familiar with, and for this reason they are very slow to try new brands of iron. They frequently pay $1 or $2 a ton more for iron than the price of an equally good iron. The reason why they are unable to judge one iron as correctly as another, is that different ores impart to iron a peculiar characteristic, that is apparent to those who have not made a study of fracture in different brands of iron. This is illustrated in the case of the Crane, Allentown and Thomas irons above referred to. The colonel was able to judge these irons correctly, so long as the same ores were used, but when a change was made in the ores he was all at sea, and increased the quantity of hard iron and decreased the soft, in his mixture, when a soft iron was desired. It may be asked, were not the No. 1 and No. 2 irons made from the same mixture of ores, and should they not have presented the same characteristics? They were made from the same ores and may have been made from the same cast in the furnace, yet they presented entirely different fracture characteristics to the close observer and gave entirely different results when remelted. In the No. 2 the hard iron had blended and united with the soft iron, while in the extremely soft No. 1 it had not united, and when remelted separated from it in the casting. This phenomenon in iron will be explained when melting shot and burned iron. The furnacemen, at whose furnaces these irons were made, employed chemists to ascertain the cause of this peculiar characteristic of the irons; but they were unable to determine the cause, or suggest a remedy. And it is doubtful, even with the advancement made in the chemistry of iron at the present time, whether a chemist would meet with any more success in handling this peculiar iron; for I do not think an analysis would show that the hard iron would separate from the soft when remelted.

To attempt to illustrate the characteristics of fracture in pig iron, would only be a waste of space, for neither the artist, the engraver, nor the press, can reproduce them on paper in a way that would be of any value to the reader. To attempt to describe them so minutely as to enable the reader accurately to judge an iron would be equally useless, but a few points on the fallacies in fracture may be of value:

The sow and the sow end of a pig shows a larger crystal and more open iron than the tail end of the pig. The pig when broken in the center is said to show the average crystal of the pig and to indicate the quality of iron, but it does not always do so. The iron may be more accurately judged by breaking the pig near the ends and comparing the fractures. If the sow end indicates a very soft iron, and the tail end a very hard or very close iron, the iron will run hard in a light casting, and harder in a heavy casting some distance from the gate than near it. A sharp-pointed draw-out crystal indicates a strong iron. This may be deceptive, as the shape of the crystal can be changed to some extent, by the way in which the iron is broken. A pig broken with numerous light blows will show a sharper pointed crystal than the same pig when broken with one heavy blow. This, of course, does not apply to high silicon irons, that break at the lightest tap of the sledge. A dark bluish fracture shows a soft iron, and a light silvery fracture a hard iron. This is changed by the presence of silicon, and a light colored crystal may indicate a softer iron than a dark one; but the dark fracture is the stronger and better foundry iron. A high silicon iron without crystal and a white hard iron present similar fractures and are distinguished from each other by the silicon or soft iron having a light bluish cast and a dull ring, while the hard iron has a whitish cast and a sharp ring.—Edward Kirk, in Iron Trade Review.

Pennsylvania's Pioneer Blast Furnaces.

Iron ore was known to exist in Western Pennsylvania in the days of the revolution. In 1780 mention is made of a bed of iron ore in a land transfer on the Youghiogheny in Fayette county. In 1790, John Hayden, of Haydentown, Fayette county, smelted a small piece of iron from this vein in a blacksmith's fire. He interested John Nicholson, of Philadelphia, then State Comptroller, in a project to erect an iron plant, and as a result the Hayden furnace in 1792. But before this time William Turnbull, Peter Marmie and Col. John Holker had erected a furnace on Jacobs creek, in Fayette county, the first ever put in operation in Western Pennsylvania. It was located about a mile above

the mouth of the creek, and was blown in on November 1, 1790.

This pioneer furnace, during its operation, bore a number of names. It was known as Jacobs Creek furnace, Alliance furnace, Alliance Iron Works, Turnbull's Iron Works, and Col. Holker's Iron Works. The old furnace was operated spasmodically until 1802, and, it proving a losing venture, not an uncommon thing with the early iron furnaces in this section, was then abandoned.

Peter Marmie, who was connected with this pioneer attempt at iron making, was a most picturesque character. He was a Frenchman, who came to this country with Lafayette as private secretary. In 1793, after the dissolution of the firm, he was left alone with the furnace and forge. Loss of fortune and shattered ambition drove him to despair, and tradition would have it that one stormy night he committed suicide by jumping into the fiery mouth of the furnace, first driving in his faithful hounds.

For long years there have been stories of Marmie, 'the mad Frenchman," and he is now the "specter huntsman" of that section of Fayette county, and the mountaineers will tell you in all the earnestness how on stormy nights he can be seen to wind a parting blast upon his horn and disappear in the ruins of the old furnace.

Besides manufacturing implements of peace this old furnace turned out munitions of war. Turnbull was the agent for Pennsylvania during the revolution, and in 1792 Gen. Knox, then secretary of war, wrote him to secure shot for the six-pounders at the old furnace. Later shells and shot for the howitzers were furnished, and the shot used by Gen. Wayne in his expedition against the Ohio Indians was manufactured here.

Another historic Fayette county furnace was Union furnace, on Dunbar creek, which was put in operation in March, 1791. It was built by Isaac Meason. Two years later it was replaced by a larger one.

The old Fairfield furnace, on Georges creek, was built by John Hayden in 1797, and the following year he sold it to John and Andrew Oliphant and Nathaniel Breading. A few years later the Oliphants became sole owners, and it was at this furnace that the first attempt to use coke as a fuel was made. Cannon balls used by Gen. Jackson at the battle of New Orleans were cast here. They were rafted down the Monongahela, Ohio and Mississippi rivers.

Pine Grove furnace was built in George township in 1795. It was located on Pine Grove run, near the present town of Smithfield. The Plumsock Rolling Mill was built in 1794, Laurel Hill furnace in 1797, Redstone furnace the same year, and Springhill furnace in 1794. Cool Spring furnace was erected in 1816, and New Laurel Hill furnace in 1820. As early as 1811 a fine grade of steel was manufactured at a furnace operated by Truman & Co., at Brownsville.

Of the old furnaces of Western Pennsylvania none are more interesting than those of Westmoreland county. Ligonier valley was an important center of the early iron industry, and in 1792 the old Westmoreland furnace was erected near the foot of Laurel Hill, a few miles from Ligonier. This furnace was built and operated by John Probst, and the following year he built a forge there. At one time this furnace was owned and operated by George Anshutz, one of Pittsburg's pioneer iron makers.

In 1802 Gen. Arthur St. Clair built the Hermitage furnace, on Mill creek, two miles east of Ligonier. This was after his removal from the governorship of the Northwest Territory, and he hoped by this venture to retrieve his lost fortunes, but he was unsuccessful, and in the end lost everything, and was forced from his spacious home nearby to end his days in poverty and neglect in a miserable cabin up on the Chestnut Ridge mountains. In 1808 this furnace was purchased by Gen. O'Hara, of Pittsburg, and was operated until 1818.

Another interesting Ligonier valley furnace was old Washington furnace, the ruins of which can still be seen on the Pittsburg and Philadelphia turnpike a mile above Laughlintown. This furnace was erected by Johnston & McClurg, of Pittsburg, in 1809, and was operated until about 1856. California furnace, near by, was erected in 1853, Hillsview furnace was erected by L. C. Hall in 1850 and Oakgrove furnace in 1853 by Colonel James Clifford. These make up the old furnaces about Ligonier.

Old Ross furnace, on Tubmill creek, was built in 1814. It is now on the resort of the Ross Furnace Club, a well-known Pittsburg organization. Hannah's furnace, near by, was built in 1810. A new stack was built here in 1842 and the furnace was operated until 1855. Baldwin furnace, on the Conemaugh, was built in 1818.

Old Kingston furnace on the Loyalhanna, at Kingston, was built by Alexander Johnston in 1811. In the old Johnston mansion, which stands near by, were born three governors of as many great states.

The first furnace in Allegheny county was built by George Anshutz, at Shadyside, in 1792. This pioneer furnace was abandoned two years later because no ore could be found in the vicinity, and the expense of bringing it from the mountains was too great.

Such were the ideas of the industry in those early days, but in the lapse of time wondrous changes have been wrought. No longer is it deemed necessary to erect an iron furnace at an ore-pit. To-day one can find in the stock yards of the great iron plants of this city ores from all parts of the world. Russia, Greece, Turkey, France, Spain, Chile, Cuba and other foreign countries all add their stores of ores to those from the Lake Superior region here in this domain of Tubal Cain.

Before the Shadyside furnace was built William Porter engaged in the manufacture of iron implements in this city. In 1803, axes, hoes, plows, iron chains, cut and hammered nails and other iron products were made here, and the immigrants who were pouring into the northwest territory were supplied with utensils here.

Joseph McClurg established a foundry here in 1803, and in it were cast the cannon which blazed in victory from Perry's fleet on Lake Erie. The first rolling mill in Allegheny county was put in operation in 1812 by Christopher Cowon. It stood at the corner of Penn avenue and Cecil alley, and had no puddling furnace connected with it. In 1814 this mill was transferred to Stackpole & Whiting, and in 1818 it was owned by Ruggles, Stackpole & Whiting, which firm failed in 1819. This section experienced a financial depression about that time.—Pittsburg Dispatch.

Molding Locomotive Driving Wheels.

Fig. 1 shows the nowel of a mold for a locomotive driving wheel ready for the cores. Fig. 2 is a cross section of Fig. 1, with, however, center core and arm cores in position. Fig. 3 is the top part of the center core that goes over the ends of the arm cores and completes the whole center core. Fig. 4 represents the cope turned over and ready to close over the nowel, with the anchor plates wedged securely to the bars, etc.

Locomotive driving wheels vary as to shape, size and the location of the counterbalance. Some are cast without counter-balances; what is determined for counter-balance weight is bolted between the arms after the wheel is cast. Others have the counterbalance cast in the wheel, provision being made for the shrinking of unequal portions by cutting the rim in two each side of the counterbalance. Some counterbalance parts are cored to enable lead to be poured in, to increase or adjust the counterbalance to the right weight. Driving wheels have been made with counterbalance cast in, and have

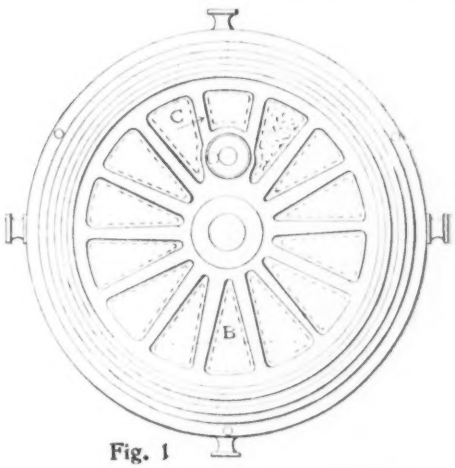


Fig. 1

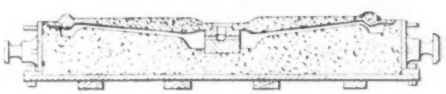


Fig. 2

also been cast with the rim solid. The internal and inevitable strains ensuing, of course. The thick counterbalance would be the last to cool, thereby drawing from the thinner portions of the rim. Water has been applied to hasten the cooling of this thicker portion, and the same is often done with wheel and pulley hubs to hasten the cooling of the thicker portions. This has sometimes been carried too far, as in the case of some twenty odd driving wheels that were cast with three counterbalances, being the entire space between the arms, and the rim case solid. Water to cool the counterbalance was plentifully and judiciously used. Most of the wheels were bored, but when it

came to pressing them on to the axles they burst like paper bags. The cooling by water is a doubtful expedient, especially in the case of locomotive driving wheels. These were wheels for freight engines, and it was done some years ago; perhaps it is not now being attempted, with driving wheels at least. There are a great many driving wheels cast now of steel, with counterbalance cast in; some with counterbalance as shown at dotted line *B*, Fig. 1, with rims cut at either side and close to the counterbalance. These should last "forever and aye." To facilitate the molding and the securing of the mold, plates are provided, to be placed between the arms as shown by the dotted lines on the joint between the arms, Fig. 1. These plates have two irons in each, with eyes in the top ends sufficiently long to come above the top of bars in the cope. When the cope is rammed, and before lifting,

Fig. 3

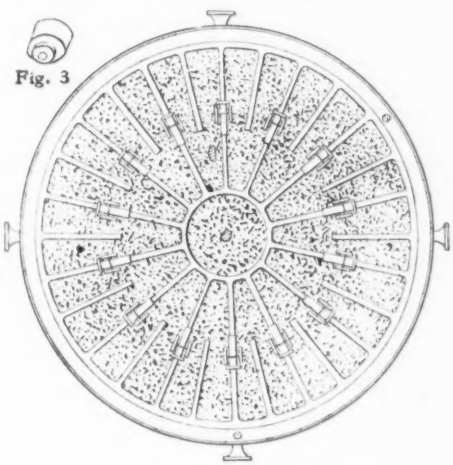


Fig. 4

rods are placed in the eyes at right angles, wedges inserted and made secure, as shown in Fig. 4.

Patterns are better solid than split. They keep shape better, are less liable to injury, and with good appliances are more expeditiously molded. Where whole flasks are used to mold driving wheels a follow board is necessary. The board should be thick and strong, to prevent twisting when laid down on the bed, so that the pattern will not spring when being rammed up, nor the board sag when the nowel is turned over.

There is much said among molders about luck; but, of course, everyone knows that there is no cause without its effect, and the reliance upon or the resigning to chance is a pretty poor qualification for a successful molder. Here follows a true tale of foundry experience: A molder who for three years had had an enviable success in molding driving wheels, whose loss of castings was not over 1 per cent, and then largely from broken cores, one morning had his attention called to a short arm on the wheels cast the day previous. Each wheel had one short arm. It was shelly at *C*, Fig 1. Of course, interest was excited and search was begun soon after that day's cast to learn if what they didn't want to find was there. It was there unmistakably, but being found thus early it was mended by burning in more iron; but it made a blemish on the casting, and also on the molder's mind. After every care and core-inspection, the unwelcome visitor appeared day after day on his three wheels, and on the same arm. There were no traits of superstition about the foundry, but in this molder there was something wrong somewhere. The foreman was consulted, and he decided, without leaving his seat and with no hesitancy whatever: "You ram your copes too blamed hard, or your sand is too wet." The molder said: "Would you please ram one cope tomorrow over that particular spot and let us have an object lesson in cope ramming?" He rammed a cope the next day, and when the wheel was examined there was the same d——d spot, or even worse. It is to be remembered that in those short arms the cores were not longer than the crank pin hub, but there was a good riser that was diligently churned upon the crank pin hub, as shown by the dotted lines, Fig. 1. The molder tried every known or suggested experiment to remedy this annoyance. At last one day three half-inch rods were punched through the cope to make three small risers on top of the short arm. That day saw a sound wheel cast. After a while two of the risers were enough; then one seemed sufficient. In a week or so there came some cause for the molder to hurry, and the half-inch punched risers were forgotten; but the arm came sound, and continued to come sound thereafter, and ever since the question with him has been: "I wonder why? I wonder why?" —L. C. Jewett, in American Machinist.

The Reason.

First Helper: What wus de matter Dinney dat you laid off all last week, did you

have a head full of rosin, an' are you jus' soberin' up?

Second Helper: Naw, I laid off to get rid of dat molder I wus helpin'. I use to have to watch him an' tell him what to do on every flast. He made me tired, he never will learn anything.

Pointers on Molding Sands.*

A good molding sand will resist the pressure of the liquid metal, give free escape to the gases, separate easily from the casting when cool, leaving a clean, smooth surface.

Use as open a sand as the character of your work will permit.

An open sand will carry more water, can be rammed harder, will vent easier, and hold the blacking better than a strong sand.

The amount of free silica in sand denotes its openness or porosity; the amount of alumina, its strength or wearing qualities.

Add a little new sand to your heaps every day.

If you are not making smooth castings, try a finer riddle before trying a finer sand.

If you are using the same sand and do not make as smooth castings as your competitor, the fault is with you, not the sand.

The same sand in different shops, on like work, under like conditions, must give like results.

The wearing qualities of sand should be a secondary consideration, as the best wearing sand is not always the safest or cheapest.

Local sands are not always suitable for local work.

Blows with the rammer cause as many blows as the sand.

Don't pour your work too hot and your castings will clean easier.

A large scrap heap is not always an indication that the sand is no good.

A sand sometimes cuts because it is not well cut.

The vent wire is the foundrymen's preventative; administer it in large doses, on all kinds of sand.

Good sand will make a good mold, but it will not overcome poor molding.

It is easier to make the conditions suit a sand than it is to make a sand suit the conditions.

*From a catalogue issued by H. S. Vrooman, 220 West Twentieth street, Chicago.

Sudden Change.

Scene: A western foundry: Time: The present.

A good molder enters foundry and asks for job at molding.

Foreman: Ever make any bad ones?

Molder: Nope. Never made a bad casting in my life.

Foreman (shaking his head): Couldn't use you young man. All the molders in this shop make their own scrap, and if I hired you I would have to buy scrap for you, and it's rather high now.

Scene: Same foundry. Time: Two days later.

First Molder (who is doubled up with another): That fellow working with me used to be a tailor over in Granite City less than two years ago.

Second Molder: Has he got his needle and thread with him?

First Molder: No he ain't, but he's got his card with him, and he gets the minimum rate of wages the same as I do.

A Circulating Library of Mechanical Journals.

We have often advocated, says the Age of Steel, the practice of placing the many industrial journals which find their way to the office of manufacturers, where the employes of these establishments could have the benefit of reading them, that thereby they might keep up with the current mechanical thought of the day, and believing that such a practice would tend not only to occupy the evenings and noon hour of the workmen to better advantage than is usually the case, but that such reading would tend also to make better mechanics, as the thoughtful and ingenious workman would naturally be led to adopt the new methods he reads of in his own daily experience, and that his own ingenuity would be stimulated to devise improved methods and appliances, and thus he would become a better and more profitable workman.

We are glad to be able to say that these suggestions are being acted upon in not a few cases, and always with encouraging results.

The latest and one of the best arranged and most practical instances of the adoption of this practice that we have seen, is that adopted by the Norton Emery Wheel Co., of Worcester, Mass.

For the reception of the large number of mechanical papers, that are regularly sent to them by the publishers of both American and foreign publications, a long and substantial table is provided, having its surface divided by low railings into a double row of compartments, into each of which are placed the recent issues

of a paper, each paper having a compartment by itself.

On the front page of each paper is posted a printed slip containing the names of the heads of departments and others with a blank space opposite each in which the taker of the paper is expected to write the date when the paper was taken out, so that the reminder to pass it on to the next person within three days will secure its return.

NORTON EMERY WHEEL COMPANY.

Hand this Magazine to next person on list within three days after you receive it.

HANDLE CAREFULLY.

Name.	Date Received.
Geo. N. Johnson	Nov. 26, 1900.
C. H. Norton	Dec. 1, 1900.
C. O. Smith	
W. A. Howe	
H. A. Collins	
Phillip Styffe	
Geo. H. Chase	
Chas. Bengston	
John Robertson	
Harry Duckworth	

To further induce the reading of these papers, and for the further enjoyment and comfort of the large office force, the company has opened a large reading and dining room on the top floor of their recently-constructed office building This building, on account of the shape of the plat of ground on which it is erected, is flat-iron-shaped, so that windows are on all sides, save in the rear. A more attractive or well-lighted room could hardly be imagined. A long dining table occupies one side, and a large range with cooking utensils occupies an adjoining room, on which cooking is done for the large force of clerks, superintendents, etc.

The special utility and convenience of this latter arrangement will be better appreciated when it is known that the works of the company are located at Barbers, a suburb of Worcester, a point where the tracks of the Fitchburg and Boston & Maine railroads, and also of a trolley line intersect. This arrangement enables the clerks to have a warm dinner at nominal cost, and to then have the balance of the noon hour for reading.

This arrangement throughout is a practical demonstration of a desire, on the part of the company, to minister to the comfort and mental improvement of their operatives, and is a thought worthy to be copied by scores, even hundreds of manufacturing concerns the country over. Such practical thoughtfulness cannot fail to produce a salutary and beneficial effect on the operatives, and cement more closely than before the sympathy and good will which should exist between employer and employee.

Among the Foundries.

A new foundry is being built at Cedar Grove, Wis.

O. F. Butts has opened an iron and brass foundry at Medina, N. Y.

Martin Payton has added a brass foundry to his plant at Madison, Wis.

Swan & Son are erecting an addition to their foundry at Bridgeport, Pa.

Ragatz & Schaeltgen have started a foundry and machine shop at Dubuque, Iowa.

The J. H. McLain Machine Co., Canton, Ohio, have built an addition to their plant.

Moser, Wehrle & Co., of Newark, Ohio, have broken ground for a new foundry.

The Keystone Farm Machine Co., of York, Pa., is building an addition to its foundry.

Samuel Green & Sons, of Des Moines, Iowa, will materially increase the capacity of their plant.

The Thomas Iron Works Co., recently incorporated, will add a foundry to its plant at Berkley, Va.

The Crescent Machine Co., Leetonia, Ohio, will build an addition to their plant in the immediate future.

The Price & Evans Mfg Co., of Chattanooga, Tenn., is making several improvements in its plant.

The Oliver Chilled Plow Co., of South Bend, Ind., are arranging to build an addition to its foundry.

The Southern Engine & Boiler Works, of Jackson, Tenn., will make extensive improvements in its plant.

The new foundry of the Gillie Machine and Engine Co., at North Tonowanda, N. Y., is nearing completion.

The Carleton Foundry Co., of Hartford, Conn., has increased its capital stock from $25,000 to $35,000.

The Lunkenheimer Co., of Cincinnati, Ohio, will, among other buildings, erect a large new foundry.

The McAleenan Boiler Co., Peoria, Ill., are building a new factory. The size of the building is 103x214 feet.

The Underfeed Furnace Co., of Omaha, Neb., has changed its name to the Western Furnace & Foundry Co.

The Record Foundry & Machine Co., of Toronto, Ont., has increased its capital stock from $100,000 to $250,000.

The Union Machine Co., of Nashville, Tenn., will rebuild its foundry recently burned at a loss of $5,000.

William Tod & Co., engine builders, Youngstown, Ohio, have increased their capital stock from $300,000 to $600,000.

J. C. Harrington has purchased the interest of his brother, W. H., in the foundry at Montrose, Pa., and is now sole owner.

John Ramsey will erect a new and modern foundry plant on Twenty-first street near Jefferson street, Chicago, 100x200 feet in size.

Galt & Bullock have been voted a loan of $17,000 by the citizens of Wingham, Ont., for the establishment of a brass foundry in that city.

The Pawtucket Foundry Co.'s new foundry in Pawtucket, R. I., is rapidly nearing completion. The plant will be under the management of F. A. Thomas.

G. W. Sitten and A. S. Reynolds will establish a foundry at Bristol, Tenn., to replace the City Foundry and Machine Works, which were recently burned.

Suelflohn & Seefeldt, hardware manufacturers of Milwaukee, have purchased four acres of ground at a price of $21,000 as a site for a new end enlarged foundry plant.

Scott Braddock and A. T. Hall, Logan, Ohio, have purchased the Logan Foundry & Machine Co. from Pierce McKay. The name of the plant will remain unchanged.

The Freeman Foundry & Machine Works, Joplin, Mo., will erect a new foundry and machine shop which will cover an entire block on Fourteenth street, extending back 80 feet.

It is reported that the Inter-State Foundry Company, of Cleveland, has leased the foundry department of the International Range and Mfg. Company's plant at Ashtabula, Ohio.

The Central Brass Foundry Co. has been organized at Cleveland, Ohio, with a capital of $2,500. Incorporators, S. Pollock, Edmund E. Allyne, Charles Zeuker, Max Littwitz and E. Heyman.

P. J. Clark & Co., Tifton, Ga., have purchased the Tifton Foundry & Machine Works from W. B. Durst and J. J. Golden. The new firm will largely increase their facilities in both their machine shop and foundry.

The plant of the American Foundry & Machine Co., at Bowling Green, Ohio, has changed hands and will hereafter be known as the Hickox-Mull Mfg. Co., and the manufacture of farm machinery will be made a specialty.

Stockholders of the Avery Planter Co., Peoria, Ill., among the leading manufacturers of farming implements in the West, have voted to increase their capital stock from $600,000 to $1,000,000, growing business demanding the increase.

The Hunt Air Brake Co., of New Kensington, Pa., are erecting a new building, 60x160 feet, to be used as a foundry department. Plans for other additions to this plant have been prepared and will be used for the manufacture of small ice machines to be attached to refrigerators.

The Southern Engine & Boiler Works, Jackson, Tenn., will build a new machine shop, 70x334 feet, new foundry, wareroom, blacksmith shop, etc. The machine shop and foundry will be equipped with electric traveling cranes and all the latest improvements in machine shop practice.

Pattin Bros. & Co., Marietta, Ohio, have just completed a new brick foundry and pattern shop for the production of gray iron and brass castings of every description. The molding room is 50x120 feet, with a traveling crane the entire length. The cupola room is 16x32 feet and the pattern shop 26x38 feet. The entire equipment is modern and up to date.

The large addition to the machine shop and the new building provided for the brass foundry, boxing and brass polishing departments of the Bullock Electric Manufacturing Co., Cincinnati, Ohio, are nearing completion. When occupied they will so increase the floor space and improve the facilities to such an extent that the capacity of the works will be nearly doubled.

The Somersworth Foundry Co., of Rollinsford, N. H., has filed articles of incorporation. The capital is $75,000, and the object of the company is to manufacture stoves, ranges, etc. The incorporators are as follows: Elmer F. Shaw, Plymouth, Mass.; Colvin Sevin, Boston; William M. Bowman, Plymouth,

Mass.; John S. True, Charles T Moulton, Dover.

The Nazareth Foundry & Machine Co., Nazareth, Pa., have organized with a capital stock of $15,000. G. A. Schnubell, J. A. Miller, M. T. Schwartz, J. J. Heintzelman and Conrad Miller are the incorporators. A site has been secured and a large building will shortly be erected. The company purpose to go into the manufacture of machinery quite extensively.

The Hassell Iron Works Co., Colorado Springs, Col., who have heretofore been operating a foundry, will engage in the manufacture of heavy mining machinery, and will also open a general machinery store. F. A. Rider, formerly of the Bass Foundry & Machine Co., Fort Wayne, Ind., has been admitted a member of the firm, and will have charge of the engine and boiler department.

The plant of the United States Machine Co., at South Williamsport, Pa., was entirely destroyed by fire December 22, entiling a loss of about $20,000 and throwing 25 men out of employment. The company manufacture wood working machinery, and expect to rebuilt their plant. Their office having been consumed, they request manufacturers to send them catalogues and prices of all tools and supplies in the machine business.

Additional ground has been bought by the Phillips Mine Supply Co., of the South Side, Pittsburg, Pa., on which it will erect an extension to the foundry and machine car shops. The building will be of brick and iron construction, and will add largely to the capacity of the works. A new cupola will be added to the foundry. The present plant is turning out about 12 tons of finished material daily, and is very much cramped for space.

The Manchester Locomotive Works, Manchester, N. H., manufacturers of the Amoskeag steam fire engine, have become identified with the International Fire Engine Co., and hereafter the Amoskeag steamer will be handled by that company. The Manchester Company preserve their identity and will continue to manufacture the Amoskeag steamers. The new combination does not affect the locomotive department of the works, which is entirely independent of any combination.

The Butler Street Foundry & Iron Co., Chicago, have lately installed a new 12-ton crane and have equipped their finishing shop with new tools. The melting capacity of the foundry has been increased to 10 tons per day. They are now making contractors' and builders' supplies, gray iron castings and architectural work. They report a decrease of business in 1900, but a small increase in December over that of the last few months and the corresponding month of 1899.

The Canton Roll & Machine Co., Canton, O., have transferred their plant to the American Sheet Steel Co. The consideration was $300,000, and the purchasing agent, J. B. Baird, of Chicago. The company were organized one year ago with $100,000 capital. About 200 men are employed. This was the only company outside of the American Sheet Steel Company manufacturing rolling mill machinery. The new management say the plant will be operated.

Workmen are engaged on the construction of the structural steel to be used in the new plant of the Lewis Company, to be erected at Groveton, on the Pittsburg and Lake Erie railroad. The new plant is to be an enlarged foundry and machine shop, and is to be run in connection with the South side plant operated by the firm at Pittsburg, Pa.

The iron foundry at Baltimore, Md., heretofore conducted by George Plitt, will hereafter be known under the name and style of George Plitt & Son.

The Hutchinson Machine Mfg. Company has been incorporated at Hutchinson, Minn., with a capital of $50,000, $25,000 paid in. The company takes over the plant, business and good will of the Hutchinson Machine-Foundry Co., which they will enlarge, intending to push the business vigorously. The incorporators are: H. C. Schluter, manager; Eli Drew, Ernest Schluter, W. E. Harrington and A. H. Buckmaster. Mr. Schluter will be business manager of the new concern and Mr. Buckmaster will have charge of the shops.

The Wheland Machine Works, Chattonooga, Tenn., manufacturers of saw mill machinery and engines, have incorporated, with a capital stock of $100,000. G. W. Wheland, Z. W. Wheland, E. F. Wheland, L. B. Wheland, R. F. Calloway and A. W. Nagle are the organizers. The business formerly conducted by G. W. Wheland, under the style of Wheland's Machine Works, passes into the hands of the new company, who intend adding some new equipment, and expect in the near future to erect additional buildings.

The American Foundry Co., Rockford, Ill., who were organized last summer, made their

first casting December 22. The company have built an entirely new and up-to-date plant for the manufacture of light gray iron castings, consisting of a main room, 275x80 feet; cupola rooms, 60x35 feet; core room, 30x40 feet; pattern room, 25x30 feet; machine room, 60x40 feet; pattern room, 60x40 feet, and storage vault, 32x20 feet. A number of Adams' molding machines have been installed, and the foundry is able to handle the largest contracts in all grades of work.

The Raymond Mfg. Company, Middletown, Pa., manufacturers of machinery castings, steam heating apparatus, etc., have purchased a 15-ton electrical traveling crane and are installing the same in their foundry, and expect to have it in position by February 1st. They are also purchasing and installing at the present time a complete air system throughout their entire works for chipping, riveting boilers, calking boilers, cleaning castings and ramming large molds in their foundry. They have also greatly enlarged their foundry and are improving it in many other ways.

The Chandler & Taylor Co., Indianapolis, Ind., have commenced the erection of their new shops on ground purchased a few months ago west of the city, consisting of 22 acres. The first building to be erected is for a foundry, and is 275 feet long by 120 feet wide. Near by will be another building of the same dimensions, to be used as a boiler shop. The first building is to be completed by February 1, and the second by March 1. For the present their building on West Washington street, now occupied, will be utilized as a machine shop, but next season a large machine shop will be built on the ground west of the river. The buildings are to be constructed of brick resting on a stone foundation.

The Western Foundry Co., South Albany avenue and Thirty-sixth street, Chicago, whose works were recently destroyed by fire, have erected a new and substantial plant. They have increased their capital from $30,000 to $50,000 and correspondingly enlarged their operations. They now have two foundries, each 107x210 feet; a machine shop and shipping room, 50x140 feet; an office and pattern room, 50x75 feet, and a mill room, 45x50 feet. These improvements have increased their output of light gray castings to 30 tons per day. They report an increase in business of 10 per cent. in 1900 over that of 1899, and an increase of 25 per cent. in December over that of the previous months and of the corresponding time in 1899.

The Stockham Mfg. Company, Forty-sixth street and Grand avenue, Chicago, have made many additions to their plant during the last year. They have built a malleable foundry, 100x300 feet, with a capacity of 30 tons per day, and an annealing house, 165x186 feet. The gray iron foundry has been increased from 80x120 feet to 135x150 feet, enlarging its capacity 30 tons per day; the mill room from 30x40 feet to 40x120 feet, and the electric plant has been great increased, thus affording ample light and power for the whole plant. A new office building has also been added. Besides equipping these additions with the latest appliances they have installed a new 140 horsepower Armington & Simms engine, a new cupola, two large lathes, six large drill presses and new tumbling barrels. The whole capacity of the plant has been increased 50 per cent. The Stockham works have excellent facilities for shipping, lying on the Belt Railroad, as well as the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul Railroads.

The Malleable Iron Trade in Eastern Pennsylvania.

During the past year the malleable iron trade has been fairly active, and the various shops have been running continuously. During the early part of the year prices of malleable castings ranged high, but declined with the falling prices of pig iron. October probably saw the lowest prices of the year, while at the present time the tendency is toward higher figures.

During the summer and early fall months there was some hesitancy on the part of purchasers to place the usual contracts. This was probably owing to the then approaching general election, and also may have been a holding for lower prices. These contracts have, however, all been placed. There are good inquiries in the market at this time, and no doubt the early part of the year will find considerable business placed.

The most notable addition to the malleable iron industry in this district is the plant of the Norway Iron & Steel Co., at York, Pa. This plant is now practically completed and will no doubt be making castings before this is in print. Another new plant is that of the Huntingdon Malleable Iron Co., Hunting-

don, Pa., which has been in operation since the early part of last year.

The Norway Iron & Steel Co., of York, Pa., have a very well equipped modern malleable and small casting plant. Their foundry building is 246x80 feet, built of brick, with slate roof. The annealing house is 220x65 feet, also of brick. A two-story brick warehouse 140x40, machine shop, two-story brick office, engine house and supplementary buildings have all been completed. The capacity of the plant at present will be 25 tons of castings per day, which will be increased as necessity demands. A 10-ton open hearth furnace of special design has been built, and cupola and modern foundry equipment installed. In the annealing department four furnaces of special design have been erected. These have a capacity of 20 tons of castings each; also suitable cleaning and polishing apparatus put in. The machine shop has been equipped with the latest tools and the pattern shop exceptionally well supplied with wood working machinery. The mixing and melting of the mixtures will all be governed by chemical analysis, and we are advised that an exceptional quality of both malleable and steel castings will be produced.

The York Mfg. Co., York, Pa., have greatly increased their business during the year in both the malleable castings and ice making machinery departments. Their capacity in the former has been about five tons a day, but has been increased to 10 tons, and can be increased to 15 tons per day with the present equipments. A new 10-ton air furnace will be built in the near future, and other alterations to buildings and flask yard made so as to obtain more floor space for molding. In the ice making machinery department considerable special machinery has been installed during the year, thereby facilitating the making of special parts of machines. The business of this department has increased 50 per cent. over that of last year, and the sizes of machines have been larger. Seventy-five machines have been built and shipped thus far during the present year. Inquiries are good, and the volume of business taken both for malleables and ice machines is quite satisfactory.—Iron Age.

The Crane Company and their Employees.

The Crane Company, of Chicago, have just furnished splendid and substantial evidence of appreciation of the services of their employees which is of a sort seldom offered by corporations. The company have declared a dividend of $1,000,000, or 25 per cent., on their capitalization of $4,000,000, but of greater public interest and of vast meaning to those who are seeking a solution of the differences between capital and labor is the announcement that every employe of the Crane Company will receive a dividend of 5 per cent. on his earnings during the past year. For instance, the employe whose salary is $1,000 will receive $50 as his share.

Nearly $100,000 will be divided among the employes of the following plants in Chicago and branch houses in other cities: 10 North Jefferson street, at Desplaines and Fulton streets, at Twelfth place and Canal street, at 219 South Jefferson street, Chicago; at San Francisco, Sioux City, St. Louis, Omaha, New York, Cincinnati, Los Angeles, Philadelphia, Portland, Ore.; Kansas City and St. Paul.

Richard T. Crane, president of the Crane Company, originated the plan and carried it through. Mr. Crane believed that the splendid profits were largely due to the loyalty and energy of the men, and when he proposed the division the other stockholders were quite as enthusiastic. Mr. Crane's generosity has been shown on many occasions. He is a great advocate of manual training in public schools, and six years ago he provided an ample fund for equipment for manual training in the grammar grades of Tilden School, Chicago. Splendid results followed, encouraging Mr. Crane to continue the work.

The great business of the Crane Company was started in a very small way. In 1855 Mr. Crane opened a small brass foundry in a lumber yard belonging to his uncle, Martin Ryerson. Later he was joined by his brother, Charles S. Crane, and the business in 1865 was moved to larger quarters in Lake street. The story from that time is one of expansion and profits. The company are manufacturers of wrought pipe, but are especially known as the largest manufacturers of fittings and other supplies for gas, steam and hot water service. They manufacture more than 7,000 different articles.

The main offices of the company are at 10 North Jefferson street, Chicago, and the officers are: Richard T. Crane, president; C. R. Crane, first vice-president; R. T. Crane, Jr., second vice-president; J. B. Murphy, secretary and A. F. Gates, treasurer.

More than 3,500 men and boys are employed in the various factories and branches.

When interviewed in regard to the company's method of sharing profits with their workmen, President Crane said:

"Some time ago, when we were considering the results of our year's business, it occurred to me that inasmuch as we had enjoyed a great prosperity it would be no more than a just act to share our profits with the men, who, by their labor, made it possible for our business to thrive. The officials of the company were consulted and we decided to set aside $100,000, to be distributed among our employes. Two years ago we divided a like amount between the heads of departments and foremen. This year we included every one on the pay rool, from the office boy up.

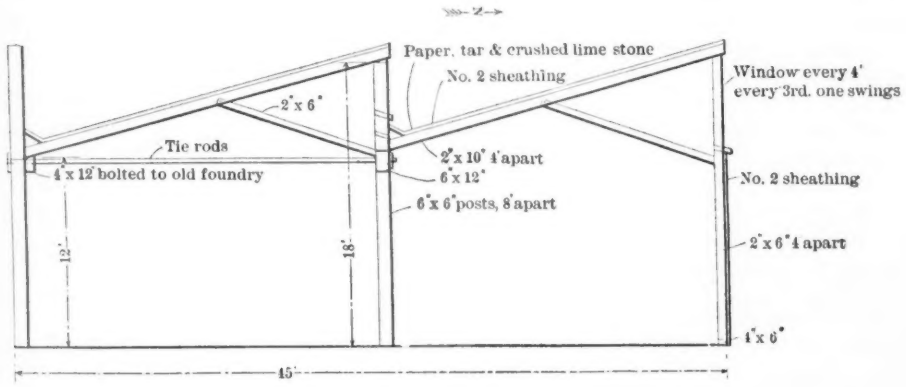
"I think this is a plan which other employers of labor could follow with pleasing results. There is no question but it brings the employe into closer touch with his employer, and I believe stimulates good feeling all around. On the other hand, it seems to me that the men who, by the sweat of their brow, build up a business and help to increase profits, are entitled to a portion of the results of their labor.

"Some years ago we tried the co-operative plan of conducting our business, but found it to be unsatisfactory, for the reason that petty jealousies cropped out among employes, and general results did not justify us in continuing along this line. The plan of voluntarily sharing profits at the close of a year's business does away with these objections to the so-called co-operative system and places the employe under no obligations to his employer, and *vice versa*."

Saw Tooth Roof for a Foundry.

Some time ago we put up a temporary foundry, and it is built with a saw-tooth roof. It is 162x45 feet, 12 feet high at the eaves and 18 feet at the gables, with the roof in two sections and a row of posts down the middle. The light is very good, but the ventilation is not so good as it might be, on account of the very low roof.

The hight should not be less than 20 feet at the eaves and 30 feet at the gables. We used tar and crushed limestone for the roof, using no flashing in the gutters, and have had no trouble from leakage or snow. The roof is 18 inches lower at the west end than at the east end, which gives good drainage to the gutters. Have had some trouble from sweating, but this could be avoided in a permanent building.



A FOUNDRY ROOF.

We placed the roof windows vertically instead of inclined, which seems to be the common practice. We believe this to be practically as good and much cheaper. Sketch shows general construction of building, which has answered its purpose very well and was very cheaply built. All factory buildings which we may have occasion to build from now on will have saw-tooth roofs.—Wilson P Hunt, in American Machinist.

Fixing Her Up in Mizzoori.

C. E. Bruff & Son have recently added some improvements to their foundry and blacksmith shop. New windows have been put in and a winter fixing up generally.—Peirce City (Mo.) Item.

Deaths.

J. L. Thomas, a well-known brass founder of Port Talbot, England, died December 21.

* * *

George Healey Jarvis, senior partner in the firm of Wm. Jarvis & Sons, ironfounders, died at his residence, Rose Cottage, Middlestown, Wakefield, England, on December 5. He was 70 years of age.

* * *

Samuel Potts Richards, at one time a prominent iron founder, died at Camden, N. J., on December 22, aged 87 years. Mr. Richards was born at Batsto, Burlington county, N. J., in 1813. He was the son of Jesse Richards, who operated the Batsto Iron Works from 1809 to 1846.

* * *

Joseph Prescott Metcalf, president of the Erie Malleable Iron Works, Erie, Pa., died in that city on New Year's day, aged 53 years. Mr. Metcalf had a wide circle of acquaintances

JOSEPH PRESCOTT METCALF.

throughout the country, especially among the malleable iron manufacturers. The greatest part of his life was spent in Erie, where he showed marked business ability in building up the industry with which he was connected.

* * *

Alfred S. Reeves, a widely known brass founder and member of the firm of Paul S. Reeves & Son, Philadelphia, Pa., died December 18 of an affection of the heart at his home, No. 2036 De Lancey Place. Born at Phoenixville, Pa., in 1862, Mr. Reeves graduated from Lehigh University in 1884, later taking a special course there in metallurgy and mining, after which he entered into business with his father.

* * *

George H. Phillips, the venerable president of the Phillips & Clark Stove Co., Geneva, N. Y., passed away in that city Dec. 8. Mr. Phillips was in his 85th year, and had had a long and interesting career as a stove man. He was born in Brunswick, N. Y., in 1816, and went to Troy, N. Y., in 1834. In 1852 Mr. Phillips became identified with the old Trojan stove firm of Davy, Anthony & Co. He was soon admitted to partnership the name changing to Davy, Ingrahm & Phillips, and afterwards Ingrahm, Phillips & Co. He retired from this firm in 1868 and founded the stove business of George H. Phillips & Co. In 1869 Walter A. Clark was admitted to partnership, and the firm style was changed to Phillips & Clark. Owing to the inducements offered by the city of Geneva this concern moved there in 1885 and incorporated under the present name of the Phillips & Clark Stove Co.

Fires.

The brass foundry of R. Hesterberg & Co., at Cincinnati, Ohio, was badly damaged by fire December 27.

The Greencastle (Ind.) Foundry & Machine Co.'s plant, together with a number of patterns, were scorched by a recent fire.

The plant of the Vulcan Foundry & Mfg. Co., at Hamilton, Ohio, burned December 21. Sparks from the cupola is the supposed cause.

The brass foundry of the Hartman Co., at 1233 North Front street, Philadelphia, Pa., was gutted by a recent fire which started in the casting room.

The S. Jarvis Adams Co., of Pittsburg, Pa., suffered a heavy loss by the burning of its pattern shop, January 2. The origin of the fire is ascribed to defective electric wiring.

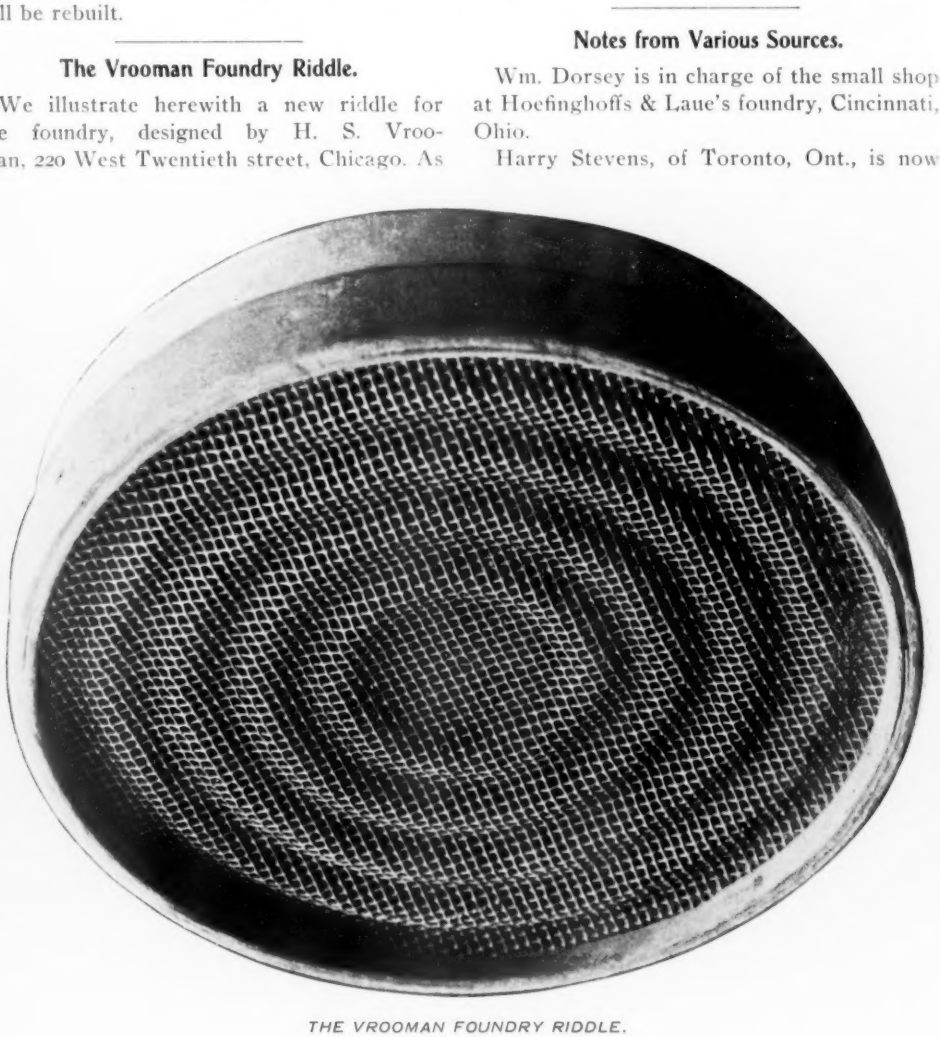
Fire of unknown origin totally destroyed the large foundry, machine shop and implement store of Hartzler & Zook, at Belleville,

Mifflin county, Pa. The loss will reach $10,000.

The plant of the A. T. Stewart Plow Co., at East Carnegie, near Pittsburg, was entirely destroyed by fire, the loss being estimated at $50,000. It is probable the plant will be rebuilt.

The Vrooman Foundry Riddle.

We illustrate herewith a new riddle for the foundry, designed by H. S. Vrooman, 220 West Twentieth street, Chicago. As



THE VROOMAN FOUNDRY RIDDLE.

Mr. Vrooman used to be a molder himself, he ought to be in a position to tell the virtues of a good riddle.

From the illustration it will be seen that the wire bottom is corrugated in concentric circles, which increases the screening surface and adds rigidity to the bottom. The screen as thus made riddles sand faster than one made of flat cloth, from the fact that the sand strikes the corrugations and passes rapidly through the meshes instead of a large part sliding over them, as in the old style of riddle. The corrugations also spread the sand over a greater screening surface. It has been demonstrated that the corrugations increase the working capacity of a riddle fully 50 per cent.

Notes from Various Sources.

Wm. Dorsey is in charge of the small shop at Hoefinghoffs & Laue's foundry, Cincinnati, Ohio.

Harry Stevens, of Toronto, Ont., is now foreman of Reid & Brown's foundry in that city.

Frank Schaech is in charge of the Bing Foundry and Machine Co.'s plant at Philadelphia, Pa.

T. F. Shea, of Chicago, will be foreman of the new foundry of Hunt, Helm, Ferris & Co., at Harvard, Ill.

H. R. Hyndman has been appointed assistant sales agent of the Washington Coal & Coke Co., of Pittsburg, Pa.

The Smooth-On Mfg. Co., of Jersey City, N. J., have issued a pamphlet giving the cost of obtaining different analyses from their analytical laboratory.

There is talk of a consolidation among the stove foundries of Western Ontario. The proposed combination of the stove foundries on this side has fizzled out.

The Eureka Foundry Co., Eureka, Cal., situated on the shore of Humboldt Bay, and having 445 feet of deep water frontage, has entirely rebuilt its plant and nearly trebled its capacity.

The C. A. Stevenson Pig Iron & Coke Co. has been incorporated at St. Louis, Mo., with E. H. Stevenson, president and treasurer; A. B. Stevenson, secretary and C. A. Stevenson, general manager.

Ed Thayer, formerly of the Toronto (O.) Foundry and Machine shop, has accepted the position of foreman in the foundry of the Davis-Price Foundry & Machine Co., New Cumberland, W. Va.

Dr. R. G. G. Moldenke, who has removed from Pittsburg to New York City, continues as consulting engineer for the Pennsylvania Malleable Co., operating a large foundry at McKee's Rocks, near Pittsburg.

Mr. Robert T. Mickle, M. E., formerly with the Kensington Engine Works, Limited, Philadelphia, Pa., has been elected vice-president of the Philadelphia Pneumatic Tool Co., to fill the vacancy caused by the resignation of Mr. George W. Borton.

C. A. Lawton & Co., of De Pere, Wis., have just replaced their old cupola with one of the latest improved Whiting patent cupolas. This, together with a new Buffalo blower, gives them a melting capacity of about 5 tons per hour, nearly doubling their former output.

Mr. Y. Watanabe, architect Imperial Japanese Navy, has contracted with the American Bridge Co. for the steel work for a foundry and a gun mounting shop for the Kure Arsenal. The American Bridge Co. is also furnishing steel work for the forge shop for the Kure Arsenal.

The Lane & Bodley Co., of Cincinnati, Ohio, write us that their draughting room, including drawings, pattern shop, office, all departments of machine shops, power plant, electric light and heating systems were not destroyed in the recent fire, and that they are already prepared to resume work in them.

The Davis-Price Foundry & Machine Co., New Cumberland, W. Va., are now operating the plant of the Shetter Foundry & Machine Co. The new company are making extensive repairs in the machine shop and will install a new cupola in the foundry. They will manufacture clay working and mine machinery.

Hiram O. Whitney, for many years foreman and stockholder in the Vermont Snath Co., at Springfield, Vt., lately purchased a controlling interest in that concern, and is now president and manager of same. Walter White has been elected assistant treasurer of the same company. An addition has been built which nearly doubles the capacity of its plant.

A catalogue of Air Hoists and other pneumatic hoisting appliances is issued by the Northern Engineering Works, Detroit, Mich. This catalogue is intended as a supplement to their Crane Catalogue, and contains descriptions of the various types of pneumatic hoists and cranes made by this company. Dimension tables and diagrams showing air consumed, etc., are given in detail.

The Sturtevant Engineering Co. has recently moved its London, (Eng.), office to 147 Queen Victoria street, that city, in order to secure the increased accommodation necessary for its rapidly growing business as the European representatives of the B. F. Sturtevant Co., of Boston, Mass. A new branch office has been established at 31 Rue de Provence, Paris, and a change made in the location of the Glasgow office to 45 Hope street. The offices at Berlin, Stockholm, Amsterdam and Milan remain the same.

The American Bridge Co. announce the following appointments: E. W. Stearns has been appointed manager of the East Berlin, Conn., plant. Frank S. Moore has been appointed manager of the Lafayette, Ind., plant. All the Pittsburg plants have been consolidated into one, and J. W. Walker appointed as manager. Mr. C. A. Billings having been appointed assistant treasurer for the New York District, H. W. Post has been appointed as manager of the Post & McCord plant.

The B. F. Sturtevant Co., of Boston, Mass., was recently in receipt of a letter from the Enterprise Foundry Co., of Sackville, N. B., which contained this interesting evidence of the endurance of one of their blowers. "We have had one of your No. 6 noiseless blowers in use for 28 years with entire satisfaction,

but the blast wheel is now apparently worn out and the left side piece is broken. If we had this left side piece and the blast wheel, as shown in your circular, it would make the blower all right. Can you furnish this for the No. 6 blower which you were selling in 1872? This blower is driven by two belts, but we fear we have been driving it at too high a speed."

The Tropenas Steel Casting Association of America has been formed by companies now operating or proposing to operate with the Tropenas steel casting process. The process is similar to the Bessemer process, the main differences being that the air is blown from above onto the surface of the metal in the converter, instead of through the metal, and the converter is of small size, say two or three tons. Several plants to operate under the process have already been built and others are to follow. The association is composed of the following concerns: The Sargent Company and Fraser & Chalmers, Chicago; the Milwaukee Steel Casting Co., Milwaukee, Wis.; the American Hoist & Derrick Co., St. Paul, Minn.; the Union Iron Works, San Francisco, Cal.; the Kelly Plow Co., Long View, Tex.; the Wm. Kennedy & Sons Co., Owen Sound, Ontario. The officers elected are as follows: W. D. Sargent, Chicago, president; D. L. Kennedy, Owen Sound, vice-president; P. Morat, Chicago, secretary; Oliver Crosby, St. Paul, treasurer.

In order to provide facilities for conducting its rapidly increasing local business, the B. F. Sturtevant Co. has just removed its Chicago office to much larger quarters at 281-289 South Clinton street.

The Annealing of White Cast Iron.*

BY CHARLES JAMES.

The paper on the annealing of white cast iron, which I have to present to you this evening, is not based upon laboratory experiments, but is an abstract of results obtained from daily business practice, extending over a considerable period of time. But, though these investigations were made for the guidance of commercial operations, they seemed to be of sufficient metallurgical interest to justify their presentation to you at this time.

*A paper read before the Franklin Institute, Philadelphia.

The irons used in these operations were all of Bessemer quality, smelted with coke, no charcoal or other special iron being used. The melting furnace charges consisted of a mixture of gray and white irons, of which the following is an average analysis:

	Combined Carbon.	Graphitic Carbon.	Silicon.	Manganese.	Sulphur.	Phosphorus.
White iron..	3.50	0.50	0.50	0.20	0.08	0.08
Gray iron...	0.50	3.50	1.30	0.30	0.02	0.03

The charges varied from 15 per cent to 25 per cent of white iron, from 50 per cent to 60 per cent of gray iron and from 20 to 30 per cent of scrap iron from previous meltings. The variations were made in accordance with the variations in the components of the pig iron and the description of casting required. The composition of the charges was regulated by the silicon content, which was made to vary from 1.20 to 0.90 per cent. The higher percentages of silicon were employed when very hot and very fluid metal was required.

The average chemical composition of these mixtures was:

	Per cent.
Carbon	3.40 to 3.80
Silicon	0.90 to 1.20
Manganese	0.35 to 0.20
Sulphur	0.05 to 0.04
Phosphorus	0.04 to 0.03

The iron was sometimes smelted in a cupola, but generally in an air furnace. The air furnace charges were from 3 to 5 tons, and the furnace was preheated to nearly a melting temperature before introducing the charge. The time occupied in melting was usually from three and one-quarter to three and three-quarters hours. As soon as the charge had completely melted the bath was well rabbled, to obtain as complete a mixture as possible. Test pieces 8 inhes long and 1¼ inches in diameter were then taken, and as soon as the iron had solidified the test pieces were rapidly cooled and broken. They usually show a gray or highly mottled fracture, and the subsequent operations were conducted accordingly. The fining and final heating of the metal generally occupied from 35 to 40 minutes, and was continued until a similar test piece was obtained free from all traces of gray iron. The casting made from such iron, however, frequently contains some graphite, due possibly to the different conditions of cooling;

but this graphite rarely exceeded one-half of 1 per cent, as the following analysis, which is an average from a large number of such castings, will show: Combined carbon, 3.02; graphitic crbon, 0.47; silicon, 0.78; managenese, 0.120; sulphur, 0.05, and phosphorus, 0.04.

The annealing furnace charges varied from 2 to 3 tons, the castings being placed either in the open furnace and the flame and furnace gases allowed to pass uninterruptedly over and between them, or packed in covered boxes of cast or wrought iron. No difference in the results, except as to scale, was to be observed or detected by either chemical analysis or physical tests, provided the heat treatment was conducted so as to compensate for the changed conditions. Castings packed in boxes, being practically solids of the same dimensions as the boxes, require a longer time to attain the same heat condition throughout their mass than do individual castings treated in the open furnace. But, as castings packed in boxes retain their heat for a greater length of time, as the annealing effect continues for some time after the mass begins to cool, the total time required for either operation is nearly the same.

THE CARBON CHANGE.

The weight of the various castings treated ranged from ½ ounce to 2,000 pounds and over. The time required to effect the carbon change—to be hereafter described—varied from three and one-half to ten hours from the time the castings had attained their full temperature. The temperature at which the carbon change takes place in castings of this description lies between the melting points of silver and copper, and may, therefore, be approximately taken as 1850 degrees F.

The change in the condition of the carbon, in irons of different composition, occurs at different temperatures. The range of temperature, however, at which the changes take place in different irons is not very great, and always closely related to and governed by the temperature of their solidification, and this temperature in turn is largely governed by the relative amounts of carbon, silicon, manganese and sulphur contained in the iron. For irons of similar composition the length of time required to complete the annealing effect in any casting depends upon the section area of that casting. Thus, of two castings of similar chemical composition before annealing, but of different sectional areas, the one weighing 53 and the other 1890 pounds, the smaller casting, after three and one-half hours' annealing had the following chemical composition: Combined carbon, 0.61, and graphitic carbon, 2.83; and the larger casting, after seven and one-half hours' annealing, gave: Combined carbon, 1.65, and graphitic carbon, 1.85. This casting had to be returned to the furnace and subjected to a further annealing of three and one-half hours' duration, after which it approximated closely in chemical composition to the smaller casting.

The change of carbon in castings subjected to the annealing process, though gradual, is co-extensive throughout any given cross section of the casting; no hard center or core of white iron, surrounded by softer metal, having ever been observed in any of the castings examined. No matter at what period the annealing process may have been arrested, the total surface of any fracture always showed a similarity in the condition of the metal, provided the composition of the metal was homogeneous, and the heat treatment had been applied equally to all parts of the casting.

We will now consider the nature of the change or changes that occur in the casting during annealing, and to enable us to do this we will take the analysis of an average casting produced by this process, both before and after annealing:

	Combined Carbon.	Graphitic Carbon.	Silicon.	Manganese.	Sulphur.	Phosphorus.
Before annealing.	2.60	0.72	0.71	0.110	0.045	0.039
After annealing....	0.82	2.75	0.73	0.108	0.04	0.039

From these analyses it will be seen that the only change effected is one of condiiton in the carbon, a large proportion of which has passed from the combined into the graphite state. I wish, however, to say that, though for convenience the term graphite is employed in stating the analyses of these castings after annealing, the condition of the carbon—as I shall presently show— differs very materially from graphite, either as found free in nature or as solidified out from gray iron during cooling.

THE INFLUENCE OF CHEMICAL COMPOSITION.

It has already been shown that the relative quantity of combined and graphitic carbon found in any specimen of iron after annealing depends upon the heat treatment it has received in relation to its chemical composition and sectional area. And it now remains to inquire what effect the other components of the iron exert upon the carbon change. This question has been directly investigated only so far as silicon, manganese and phosphorus are concerned. And of these phosphorus can at once be dismissed with the remark that, in all cases, it was found to be inoperative, at least in the small amount in which it was present in these castings.

With respect to sulphur, the investigations are not yet completed, but are still in progress. Both silicon and manganese exert great influence upon the carbon during the annealing process, the presence of silicon being a necessary condition to the carbon change. In low silicon irons it is very difficult, and, in some cases, impossible, to effect the carbon change, no matter how long the iron is exposed to the heat treatment. This fact is strikingly illustrated in the following example:

A casting of about 5-16 inch in thickness and weighing less than 1 pound, and of the following composition: Combined carbon, 2.08; graphitic carbon, none; silicon, 0.42; manganese, 0.05, was subjected to the usual treatment, but after being annealed for three and one-half hours the appearance of the casting was still hard, and had a white iron fracture, and analyzed: Combined carbon, 1.97; graphitic carbon, none. After a second annealing of three and one-half hours the appearance of the casting was still unaltered, and the analyses gave: Combined carbon, 1.98; graphitic carbon, trace. Subjected to a third annealing of three and one-half hours the casting was still hard and had a white iron fracture, and analyzed: Combined carbon, 1.90; graphitic carbon, 0.14. Thus, after being exposed for ten and one-half hours to the full annealing temperature, as well as passing three times through the much longer period of heating and cooling, only 0.14 of 1 per cent of the combined carbon had been changed to the graphite state. In the example just given, both carbon and manganese, as well as silicon, are comparatively of low percentage.

In the following instance, however, the carbon and manganese are both of fairly high percentage, but the casting, after repeated annealings, analyzed: Combined carbon, 1.76; graphitic carbon, 1.08; silicon, 0.31; manganese, 0.126, and the iron remained hard and white, and could not be machined. Indeed, the relative amount of carbon that can be changed from the combined to the graphite state during annealing seems to be directly proportionate to the amount of silicon present, as indicated by the following example, in which all thrre samples were taken from the same cast, annealed in the same furnace at the same time and under identical conditions:

	Combined carbon.	Graphitic carbon.	Silicon..	Manganese.
No. 1.....	1.49	1.40	0.56	0.126
No. 2.....	1.57	1.33	0.45	0.130
No. 3.....	1.87	1.03	0.31	0.126

In this instance the total carbon and the manganese are practically the same in all three examples, and of comparatively high percentage, the silicon being the only variant, except the condition of the carbon, which is less and less changed as the silicon in the iron decreases.

That low carbon, or at least comparatively low carbon, does not prevent the change in the carbon condition taking place seems well illustrated in the following example of a comparatively low carbon iron subjected to three and one-half hours' annealing:

	Combined Carbon.	Graphitic Carbon.	Silicon.	Manganese.
Before annealing	1.94	none.	0.64	0.09
After annealing..	none	2.00	0.62	0.110

In this instance the percentage of silicon is slightly under the normal amount usually present in this class of castings, while the manganese is well up to its average in such castings.

The influence of the manganese on the carbon change is not nearly so marked as that of silicon, and its action is further obscured by the high silicon which always accompanies high manganese, for as the percentage of manganese rises in the casting the percentage of silicon rises also. Comparatively high manganese, however, assists the carbon change and shortens the time necessary for its completion. This is illustrated in the following analysis of a high manganese casting after being annealed for three hours only:

	Combined Carbon.	Graphitic Carbon.	Silicon.	Manganese.
Before annealing	3.68	none.	0.93	0.30
After annealing..	none	3.62	0.95	0.31

In this instance the casting shows signs of over-annealing, and the process had evidently been carried on much longer than was necessary.

The action of silicon and of manganese upon the carbon change is apparently of an essentially different character, that of silicon being direct upon the carbon, compelling it to change its condition, while the influence of the manganese is only indirectly upon the carbon through the silicon by protecting the latter from oxidation during the melting of the iron, thus causing the percentage of the silicon in the casting to be higher than it would be if the manganese had itself been more completely oxidized from the bath. This also accounts for the fact that comparatively high silicon and comparatively high manganese and the reverse are always coincident.

LOW SILICON, LOW MANGANESE IRONS WORTHLESS.

In every case, however, irons low in silicon and manganese are practically worthless after annealing. Such irons may be softened by the process, so as to machine easily, but are always deficient in tenacity. They generally have a white fracture, in appearance like that of a 30 per cent. carbon Bessemer steel bar. The analysis, after annealing, of two such irons are given for comparison:

	Combined Carbon.	Graphitic Carbon.	Silicon.	Manganese.
No. 1.....	2.65	none.	0.46	trace.
No. 2.....	1.97	none.	0.42	none.

The analysis shows that there was no change of the carbon conditions during annealing. The samples machined easily, but broke to pieces under the pressure of the lathe tool.

ANNEALING TOOL STEEL.

That this change of carbon, from the combined to the graphite condition, can be produced by this method of annealing in other combinations of iron and carbon, as well as in white iron castings, is proved by the following experiment carried out upon a hammered bar of crucible tool steel, which analyzed before annealing: Combined carbon, 0.97; graphitic carbon, none; silicon, 0.32; manganese, 0.31. After four hours of annealing the sample exhibited only the appearance of well annealed tool steel, except that a skin of bright iron, similar to that seen around some malleable iron castings, had appeared. After a second annealing for four hours, the bright skin had deepened into the bar, and the remaining portion of the cross section had a leady appearance. After a third annealing of four hours, the bright skin had increased still more in depth, and the remaining portion of the cross section had become black with graphite carbon, some bright spots, however, Combined carbon, 0.47; graphitic carbon, 0.42; silicon, 0.38; manganese, 0.30, showing that nearly 50 per cent. of the carbon had changed its condition, the loss of carbon shown by this analysis being due to the decarbonizing of the surface of the bar.

NATURE OF CARBON AFTER ANNEALING.

Lastly, we have to consider the nature of the carbon found in the castings after annealing. The carbon thus formed is evidently identical with what Ledebur has called "tempering graphite carbon," and is an allotropic form of graphite, and not merely amorphous carbon, since I find, by experiment, that it differs from both these varieties of carbon in its specific gravity, specific heat and calorific power, which after careful examination I find to be as follows:

Specific gravity.....1.9 as compared to water.
Specific heat 0.2237
Calorific power .....7893 heat units.

That this allotropic form of graphite should have been mistaken for a graphite similar to that of gray cast iron, though it has none of the bright scaly luster of the latter, is not surprising, since it can be both separated from the iron and chemically determined in the same manner as the graphite from gray iron, though its combustion is much more difficult.

The chemical and physical condition attending the formation of this allotropic graphite during the annealing process, and its probable molecular form, as well as the position it occupies in the structure of the casting, which differs so remarkably from the position occupied by graphite in gray iron, have already been described in a paper read by me before this section in 1897. And I need not now refer to this part of the subject, further than to say that the change, as

at that time pointed out, affords a striking example of the solution of one solid in another, at temperatures below the melting point of either.

Contrary to Ledebur's statement, that "tempering graphite carbon" is unaffected by the hardening process, I find that iron containing this allotropic graphite hardens and tempers excellently well, and that when not fully developed by over long annealing the whole of this carbon will pass into the hardening state and leave the iron without a trace of free carbon. I also find that, by prolonged heating, this allotropic form of graphite becomes changed to graphite identical with that found in gray iron, and that it then occupies a similar position in the iron structure, and greatly injures its physical qualities, so that over-annealing should at all times be carefully avoided.

Brass Founding—Gates and Gating.

The way to gate a mold is a point of the highest importance when casting any metal. Different metals, however, require different methods of gating; what may be suitable for one will not always produce good results with another. For instance, light bronze castings may be successfully run by a gate that would be entirely inadequate for yellow brass, while aluminum will require different treatment from either.

I will illustrate, as well as the limits of a short article will allow, a good method of dealing with the subject. Fig. 1 shows a common enough pattern in some brass foundries; it is called a "stem," and in size

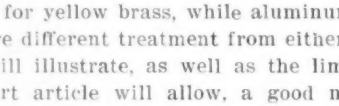


FIG. 1

it may vary from 1 to 3 inches in diameter and from 12 to 24 inches in length. In appearance it is a plain enough job, but I have known it to cause a world of trouble to the uninitiated. It will "shrink" on the back, and when poured hot enough to avoid this trouble will come dirty.

In these remarks we will exclude all diameters less than 1½ inches, as those smaller than that rarely cause trouble. A molder making this job for the first time, unless in a shop used to the work, where he may be cautioned and advised in advance, will generally gate it one one end, using a small ordinary sprue, and he will find on shaking out that his work will be all shrunk, and of course lost. The next heat will then be probably poured hotter, and then it will almost invariably be found dirty.

Fig. 2 shows a good way to overcome these difficulties. A is the feeder and B the sprue or runner, which is connected with A by a tapering channel cut in the cope. At the point where this channel joins the riser A it is made very small, the object being

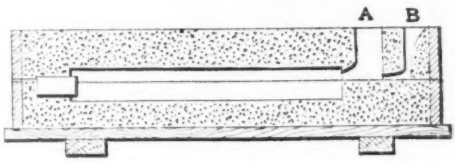


FIG. 2

to hold back the metal so that the sprue can be kept full all the time of pouring, in order that any dirt that may be held in suspension in the metal shall be prevented by its lighter specific gravity from entering the mold, as it will float on top of the head.

I have been taught by experience to gage the size of the feeder by the diameter of the casting. The feeder should exceed this a little, so that the casting will solidify first, thus giving the feeder a chance to perform the duty for which it is intended.

The gate connecting the feeder with the casting in this case is cut wholly in the cope, and is almost of the size of that part of the casting, being only so much smaller as will allow of a fillet, so that the gate can be broken off while the casting is hot without danger of "breaking in." The metal for pouring need not be very hot, provided the diameter of the feeder exceeds that of the casting.

Some brass molders do not believe in feeders, or risers, as they call them. Now, I do, although I never place them on top of a casting if they can be connected by a suitable gate, because a riser on top of a bronze casting generally leaves some defect under it when cut off; and the same holds good of aluminum, only that this metal requires much more feeding than bronze, in order to ensure solidity.

For example: Fig. 3 shows a pattern. It is a square box, the corners of which are strengthened externally by circular pil-

lars of solid metal. The comparatively heavy hub in the center is strengthened by being connected with the body of the box by brackets as shown. Now, as the walls of this box are only one-quarter inch in thick-

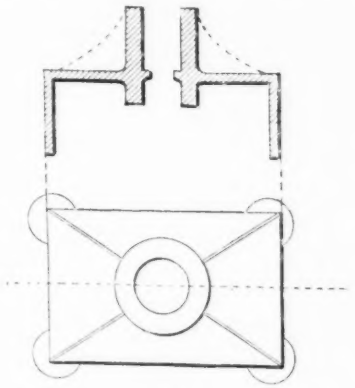


FIG. 3

ness, unless we make provision for feeding the hub by means of risers, it will be unsound, as there is no metal available to supply the shrinkage. If we are casting these in bronze it is possible to obtain successful castings by molding the pattern with the hub down—that is, by coping out the inside of the box. As these were to be made of aluminum, the molder received instructions to mold them in a three-part flask, with the hub upwards, and to place three heavy risers on top of the hub, connecting them as shown at A, Fig. 4, the risers to be placed as near the circumference of the hub as possible, and to be connected by heavy gates cut *on top* of the hub, as shown. When this advice was followed, the castings came out flawless. But Mr. Molder thought he could make them better two-parted and hub down. He took off a riser from each of the four corners, result, he lost every one, the hub being scarred by deep shrinkage seams where it joined the body of the box. This example is given to show how much more feeding is required by aluminum than by bronze. Cast in bronze, hub upwards, as illustrated, one riser would have been sufficient to secure satisfactory results. But to return to bronze: I once knew a molder who claimed to be good on heavy work; he was given a tester. The foreman had sized his man up pretty correctly, and expected him to "fall down;" and he did. He gave him a very plain job, just a ring about 10 inches in diameter and 4 inches in thickness. The molder thought he had a snap. He used a 2½-inch cope and a sprue an inch in diameter and connected this with a very heavy gate to the casting. He pierced his cope with a lot of holes by threading through a thin vent wire, and he felt like a man who had done his duty, and done it well. The mold was duly poured, and ultimately the caricature of a casting was on exhibition. It was a beautiful piece of work—of its kind. The upper part resembled the surface of the earth, and from the same cause, contraction in cooling. The upper surface was covered with little hills, these being formed by the metal rising into those vent holes and solidifying. If such a casting is to come out true to the pattern, it must be fed with metal, to make good the loss in bulk by shrinkage, from some source outside of itself, and this is a law there is no evading.

I won't say the proper, but a good way to make such a casting is to put on a feeder, 3 inches in diameter and at least 5 inches in hight, connected to the casting by a gate, say, 1½ inches in depth and 1¼ inches in width. Such a feeder if used as a sprue will be apt to produce a dirty casting, so it is policy to use an extra sprue, connected either with the feeder or running into the casting direct. Whichever way is adopted, the sprue should not be more than an inch in diameter and the gate very small, so as to enable the head to be kept full during pouring. It is a common notion among molders that brass castings require a very heavy gate; experience has shown me that this is a fallacy, a small gate enabling the head to be kept full when pour-

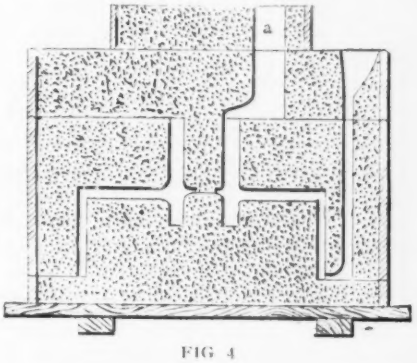


FIG. 4

ing, and suitably placed risers, to provide against shrinkage of the heavy parts, are the things to be desired for brass.

Take a brick, for instance, a common

enough job to look at, but if we wish a nice, clean, perfectly straight casting in either bronze or aluminum, we must pay especial attention to our feeder and the way we provide for the entrance of the metal into the mold. There are several good ways of making this job. We can place gate and riser at opposite ends or at the same end, and connect as in the case of the crosshead aforementioned, or we can incline the mold 1 inch (that is, place an inch block under the front), have both gate and riser at the highest point, using a riser 3 inches in diameter and 4 inches in hight, and instead

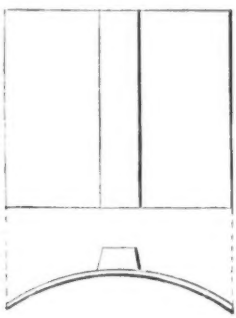


FIG. 5

of cutting the gate into the riser or directly into the casting, so that the metal will roll down the inclined mold, run a small channel from the sprue down to the lowest point of the mold and cut a small gate. The metal then enters at the lowest end, fills that and gradually and gently advances up the incline, until the cavity is filled, and then into the riser, carrying there any of the dirt that it may have gathered.

Another example is shown at Fig. 5. It is an arched plate, called a saddle, and is not a fictitious illustration. Right across the center runs a heavy rib, 2½ inches high by 2 inches in width. The plate is not a difficult thing to run; the rib is the thing that is likely to cause trouble by shrinking. The molder that made this job simply took no notice of the rib; he knew a 2½-inch riser would take care of that, so he molded his plate rib uppermost, cut a small spray gate to one end of plate, planted his riser at one end of the rib, connecting it with a good-sized gate, poured tolerably cool, and the job when cast was a work of art.—C. Vickers, in American Machinist.

Among the Molders.

The molders have fallen victims to two sorts of journalistic misrepresentation. One sort describes them only when a strike is in progress and when the writer's mental attitude is far from judicial; the other sort deals with them as a homogeneous class and not as individual human beings, with personalities as distinct as any. The former kind of injustice is quite inexcusable; but the latter, I must admit, finds a better degree of extenuation.

A foundry is certainly the last place in the world for individuality to make itself conspicuous. The room is all blackness, all dirt, all impenetrable gloom, and the men are likewise all black and dirty to exactly the same extent. They climb in and out of little holes in the ground and dig in dirt, and grope and stoop and crawl in a manner not suggestive of humanity at all. And in the afternoon—when the white-hot metal starts to run and spill and spatter, throwing strange red glares into the utmost corners (and dropping sparks on the back of one's neck) and bringing into view the groaning cranes and the dingy beams overhead—the case is no better. For then the molders turn from a very uniform type of animal to what is apparently an equally uniform type of black-and-red devil, with long, hot pokers, jabbing into unapproachable pots of metal, running hither and thither in the smoke, shouting—all in the same hoarse, unintelligible voices, and blending hopelessly in the general confused mass of grim and grimy surroundings. As the street song has it, all molders "look alike to me"—but no! not to me. I know them too well.

Before one is qualified to say sociological things about the molders one must see them with the dirt off, know them as men, and take them individually as they come along. So let us begin with the man in the northeast corner of the shop where I worked, an Italian of cow-like intellect, with just about enough education to write his name and use a two-foot rule; fit to do the same thing over and over in the same way, and that is about all. If he had any political views at all, they were probably like Pat's—"agin' the Government."

Beside him worked an Irishman, low-browed, square-jawed, ill-shapen, who usually came to work Monday a trifle the worse

for bad whisky. He had two grievances against things in general—the severe heat (for he felt it very much, and for all I know may be dead by this time), and the fact that one of his fellow-molders had succeeded in saving money enough to start a small foundry of his own. It would be the men of this sort who would be heard of in times of trouble, who would blow up things, kill people and go down in the public mind as the "typical molder."

But the next man on the list was an entirely different sort of being; a reasoning animal within limits, a conscientious worker, the father of a large and ravenous family, and a member of the Salvation Army. He had his little sad story, his little tragedy in life like the best of us, but preserved a cheery, toothless grin all the same, and it was for him we used wickedly to sing the army hymn, "Are You Washed in the Blood of the Lamb?" which, since we were all thirty of us coal black but for our eyes, seemed exceedingly fit. And there were more men, exemplary citizens, true husbands and gentlemen at heart, who could be seen any holiday in the park with their little ones, or any night at the variety shows enjoying it immensely; never in front of the saloons.

The man I worked with was a stocky little Englishman, strong as the iron he cast, who never had but one sweetheart, and now she's his wife. He was quite an amateur actor, and knew much more Shakespeare than I, possibly as much as you. He used to pose for our especial amusement as "Ajax defying the lightning" or "De Soto discovering the Mississippi," with his iron-shod rammer on a sand heap, and stab imaginary Caesar with a "gate pin." He could lift three hundred pounds and set it down again without a tremor, and at the same time fashion the sand with the end of his blunt thumb so delicately that a touch from the gentlest fingers would spoil it. Strength and delicacy of touch are seldom so combined in the same person.

Though I have objected to the hasty viewing of these men as a class, they have after all certain traits in common and one of the most noticeable of these is the pride which they have in their work. That fellow-molder of mine—the one who worked next me—was once told to destroy a mold of his making.

"What for?" said he to the foreman. "It is like the others; anything wrong with them?"

"Never mind what's the matter with it; shake it out."

"But tell me why you're not satisfied with it. It's the best I can do."

"Shake it out!"

"No, he would not shake it out, this imperious friend of mine. He would not see the "work of his head and hand" go for naught. Sooner than that, he would put on his coat and hat and seek employment in another shop, which he did.

It appears that the molder's son is likely to become also a molder. Still, he may better his condition, for all that—both outside his craft and within it. He therefore profoundly believes in the Molders' Union. The union helps him some, the mechanical school helps him a lot, the common school also, and he will come some day to own his house and his little garden (even as he is beginning to do now), and to be a decent, prosperous fellow. There still lurks in his mind the notion that "capital" is all combined to down him, but that comes from long years of soul-quenching toil and long years of being poor. You or I or anyone would feel the same after a few months' work with a short shovel at $1 a week, which is good pay for a beginner. The law of the survival of the fittest is a brutal sort of law, as viewed by the individual workman, and the law of supply and demand is worse when one must go out to meet it with the sweat of his brow and a short-handled shovel.

My friend and I argued about capital one day. Said he: "But what show is there for us poor devils; what consideration have they for us? Take that man there for instance (pointing to an individual with gray hair and gold rimmed glasses, and very slender white fingers, a single large diamond on one of them), "what respect has he for a man like me?"

This question, it happened, I could answer with confidence, the man being, though the molder knew it not, my father.

"He has," said I, "a great deal of respect for you. He respects you for your trade, your skill, for what you know. If you didn't spoil it by failing to stick to your agreements as business men do, by using uncivilized methods in your strikes, and throwing away your votes according as this or that ward

politician directs you, he would have all the respect for you in the world."

That's right; we do throw away our votes. But how are we going to know? Both parties make us promises, and both fool us more or less."

"Suppose, then, you went back and figured on how you fared in past years under each administration and voted accordingly?"

"That's what we ought to do, I guess, sure enough."

But aside from the love of doing a thing well, aside from a reverence for his craft, or whatever may be the effect of modern labor systems upon his mind and character, the molder's most noticeable trait (and the one he has first to acquire if he is going to make his living that way) is a very fine sort of animal courage. When all the molten streams are running at once, it is so hot the hair upon one's forearm will go like grass before a prairie fire.

Moreover, if anything happens to one of these men that he stops pouring, then the metal is all to be thrown away and melted up again. But who would call himself a molder who could not pour with a steady hand with those little globules of iron burning red streaks in his skin all down his back, or with the certain knowledge that the seat of his trousers is on fire?

Most people, I fancy, are familiar enough with the outward look of a foundry; they may even have peeped in, where they got unforgetable impressions of molten metal, roaring furnaces and clay kettles. Most people, I am sure, recognize the existence of warships and sewing-machines and church bells. But apparently very few are tempted to connect the multitudinous products of the foundry with the foundry itself. But for my part, I do all this and more. I never pass a foundry or even smell the smoke of one, nor see a casting that resembles what we used to make, but my mind goes back to a picture still vivid and bright. And then I think how closely we are bound to a host of men we scarce ever heard of, or whom we think of only as "classes." I am sure I was cured of that sort of narrowness in the days when I dug in the dirt with a short shovel. —Benjamin Brooks, in Boston Transcript.

The man with a big head has generally room to rent under his hat.

Buffalo Foundrymen's Association.

At the annual meeting of this association, held Tuesday, January 15th, the following officers were elected: President, Henry W. Wendt; vice-president, Lawrence Ginther; secretary, S. W. Spear; treasurer, C. M. Farrar. The executive committee consists of the following members: Gibson Howard, Geo. M. Trefts, C. M. Greiner, J. J. Lawler and H. W. Wendt.

It is reported that the convention of the American Foundrymen's Association, which will be held in Buffalo, N. Y., this year, will take place during the week ending June 22.

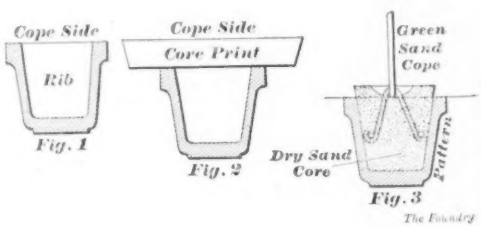
Three Methods of Molding.

The inclosed sketches show how three different shops, working under practically equal conditions, differed as to the best method of doing the same job.

It was a rectangular base, a section of the sides and ends being like sketch Fig. 1. This section was crossed by ribs, forming pockets on the inside of the base. It was in the molding of these pockets that the three shops differed.

Shop No. 1 made their pattern so that the inside of the base would be formed by a green-sand core.

Shop No. 2 used no cope. A core-print covered the cope side of the pattern, Fig. 2.



the core for forming the pocket dropping into the impression made by the print, and making all the cope necessary.

Shop No. 3 made their pattern the same as shop No. 1, but used cores for making the pockets. These cores were made to set in the pockets in the pattern, and projecting above it about an inch, Fig. 3. Hooks were used to secure these cores to the cope, which was of green-sand, the cores and cope all being lifted away together.—Hobo, in American Machinist.

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To enable foundrymen at a glance to select the brands of facings or blackings best adapted to the size, nature and quality of castings they may have use for, we classify them as follows:

For Cast Iron, Gas and Water Pipe—Best Coke, Lehigh, Reliance and Charcoal.

For Lighest Machine Brass Castings and Holloware — Talc, Soapstone and Charcoal—Cranston.

For Cores—Charcoal, Coke, Blackstone, Anthracite, Plumbago and Black Lead—Cranston-Peerless Perfect Wash.

For Agricultural Implements and Medium Weight Castings—Brilliant No. 3, Plumbago, Reliance, Blackstone, Pure Mineral XX Mineral—Cranston.

For Heavy Machinery, Rolling Mill Car Wheels, Ingots, Blast Furnaces, etc.—Founders' Perfect Wash, Brilliant No. 1, "H. B. B.," "F. & C.," Plumbago, Blackstone, North Carolina Lead, Peerless Perfect Wash.

For Car Wheels—XX Mineral Reliance, Blackstone — Cranston and Special Car Wheel Facing.

For Loam and Dry Sand Work—The same blacking as the foregoing, including also our best Coke Blacking and Peerless Perfect Wash.

For Steel Castings and Steel Converters—Brilliant No. 1, and our Special Steel Casting Wash and Special Silica.

For Brass Castings—Charcoal, Carbon, India Silver Lead or Plumbago.

For Stove Plate and Piano Castings, Light and Heavy Facings are used as follows:—First or Heavy; Brilliant No. 2 Plumbago, Blackstone, Providence, XXX Heavy, Garland and North Carolina Lead. Light or Top or Return: National Return, Eagle Return, Phoenix or Carbonized Return and Charcoal and Peerless Return.

For Holloware Castings—Soapstone Talc and sometimes extra fine Sea Coal.

For Cannon or Cylinder Stoves and Kettles—Our celebrated Cannon Stove Facing applied with camel hair brush, and our Peerless Plumbago. Sometimes a mixture of Soapstone and Fine East India Plumbago. Sea Coal is also mixed with the sand.

Sea or Stone (Bituminous) Coal Facings are invariably used in machine foundries in addition to the blackings. The object of their use is to assist in peeling a casting as well as to vent a mold. They are mixed in with the sand.

For molds that do not require it, and, which it is neither desirable nor expedient to "slick," use Blackstone, North Carolina Lead, German Black Lead, Pure Mineral or Plumbago. After dusting the mold with any of these put down the cope. None of them will wash or run before the iron and the castings will "peel" without difficulty.

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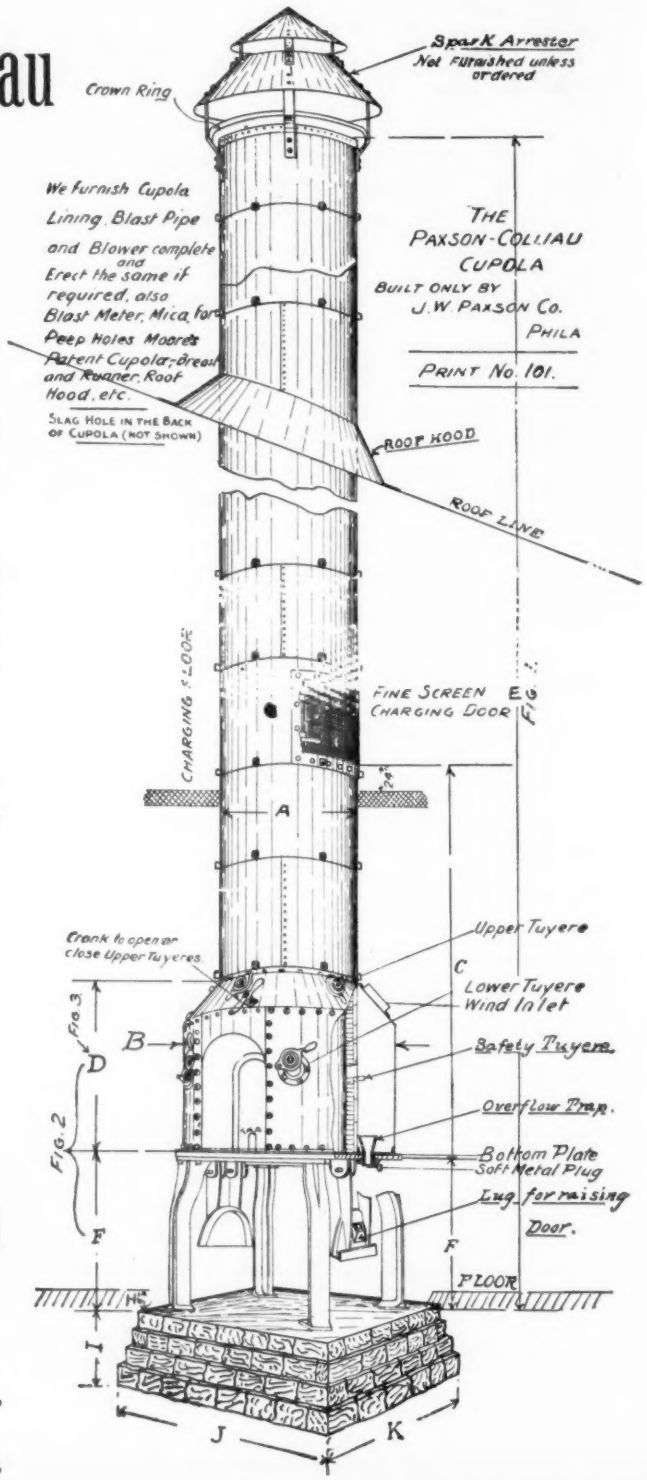

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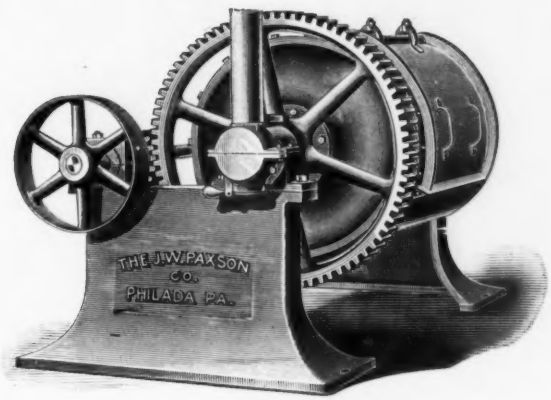

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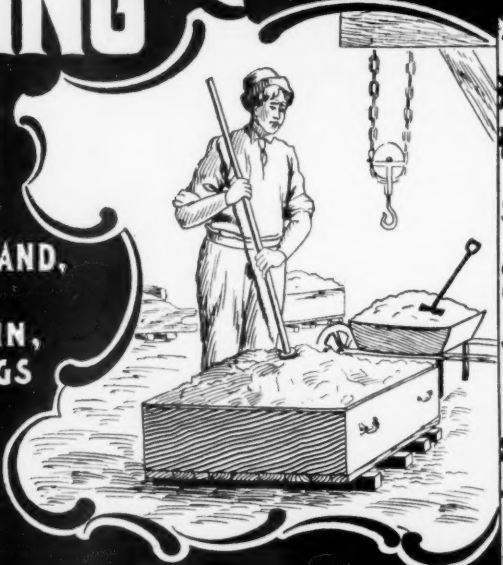

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NO ADULTERATION!

At the meeting of the American Foundrymen's Association, June 1900, one of the delegates said:

> "Plumbago blacking, it seems, is only a memory. Molders hardly ever see or handle any now-a-days. Substitutes have largely taken its place, for, like any other article that is dear, a substitute is sure to be provided. The blackings of the present day are composed, to a great extent, of common cement, pulverized anthracite, charcoal, soapstone and other cheap minerals, and it is a question if they do not cost more than they are intrinsically worth. Some of them peel very well indeed, but the great majority of cheap blackings do not peel well and are difficult to work on a mold. It would be worth while for some one statistically inclined to figure out how much longer it took a molder to properly slick up a mold —if such a thing is possible—with a poor blacking than if he had a good quality and see if the difference in time, not to speak of results, would not buy a good article. Castings are certainly much harder to clean with poor blacking. If the sand fuses—as it is sure to do on heavy work—a very bad job is the result, and, in addition to the molder's extra time on the mold, it costs more to clean the casting, and then the results are not fully satisfactory to anybody concerned, oftentimes resulting in the loss of a valuable customer. Every foundryman should strive for that which will give his shop the name of turning out the best and nicest casting in his vicinity. 'Tis the kind of policy that easily pays, particularly shops that handle machinery castings."

The points made in the foundry delegates' speech are the precise ones the Dixon Co. have built up their facing business on.

Plumbago is not with Dixon a memory, users can always buy it of us not adulterated. The soapstone, anthracite and cheap mineral adulterations we never practice.

We have a neat little pamphlet explaining the whole subject, giving a full explanation of each of our kinds, how they are made, which it will pay anyone to have.

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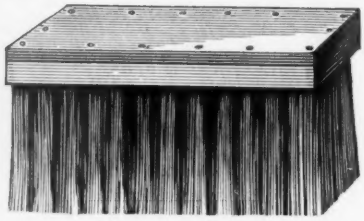

Fig. 17 in Catalogue.

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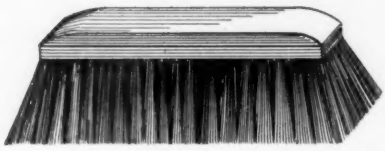

Fig. 28 in Catalogue.

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METALLIC STRUCTURES

GENERAL OFFICES:

No. 100 BROADWAY, NEW YORK CITY

BRANCH OFFICES:

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M. M. COCHRAN, PRES.
W. HARRY BROWN, V.-PRES.

JNO H. WURTZ, SECY.-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

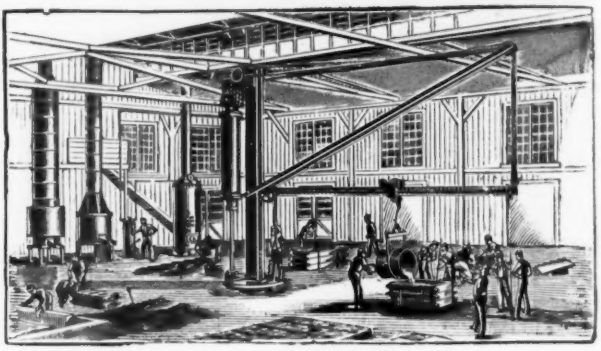
350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

You are the Son of Your Daddy



5-Ton Steam Hydraulic Crane in a foundry.

And that's what makes you such a superior person, we suppose. That's why you have only contempt in your heart for your men. Even if they did make your father's wealth possible, and yours too, right now.

Yes, sir, let 'em sweat. Will do 'em good. Opens the pores. Seashore or mountains for you these dog days; don't bother your head about the "cattle" at home in the works, do you?

Fortunately for the world all men are not like you. There are wise men who will do anything to take the hard bone labor off their good, faithful and deserving workmen. They will hitch up any time to give the boys in the mill a lift. Hitch up old Mr. Steam we mean.

This is why we place so many Ridgway Cranes all the time.

We hitch the steam right to the heavy lifting. All the men have to do is to pull the lever and the work is done. It isn't like as if you had to go to a whole lot of expense for pumps, dynamos or some other rigging. Just pipe to the boiler and the crane is ready for business. No gang of men pulling their hearts out, with the water rolling off them like a summer thunder shower.

Talk about making money! Well, if you don't have Ridgway Cranes you don't know the surprise which is in store for you and for those poor bedraggled men of yours when you do get Ridgway Cranes.

Poor fellows, let 'em sweat.

OIL-GOVERNED AIR HOISTS.

If you don't know them you should.

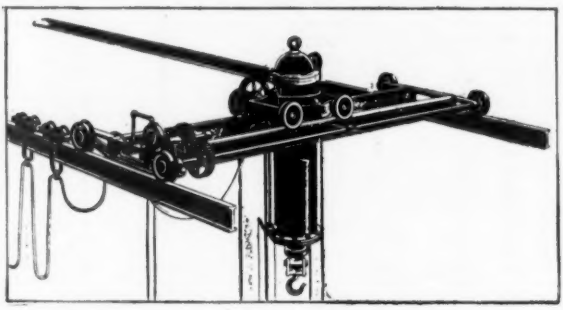
They are the only hoists to get.

All jerk, all objectionable things are done away with in this hoist.

Customers who have them constantly get more.

Costs more than other hoists to build.

Worth the difference a hundred times over.



"PLEASE TAKE THE ELEVATOR"

NICEST MACHINE KNOWN.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandauerstr., Berlin, Germany.

William Sellers & Co. Incorp.

PHILADELPHIA, PA.

Foundry Machinery.

Every Foundryman knows to his cost that machinery exposed to the dust, dirt and heat of a foundry, is subjected to very severe conditions of service, and unless it is properly designed "to stand the racket" will rapidly wear out.

Having operated Foundries in connection with our Machine Tool Works for half a century, we have had abundant opportunity to study this question in all its phases, both from the theoretical standpoint of the designer of such machinery, and from the practical standpoint of the user.

All of the labor saving appliances intended for use in Foundries, which we advertise in "THE FOUNDRY," and elsewhere, were designed primarily for our own use, and their good qualities were thoroughly tested by us in our own Foundries before offering them to the public.

We make **Foundry Jib Cranes** of iron frame work instead of wood, and without struts, thus being entirely clear of obstructions underneath. They are operated by electricity, steam, or other power, and have rapid motion in hoisting the load and in swinging.

We make **Traveling Cranes** which will lift the copes of the longest molds **absolutely vertically** and without jarring the sand. We make Cranes that lift the largest castings and transport them to any portion of the floor very expeditiously. The most perfect safety devices have been invented and applied to these Cranes, so that the load can never lower except at the will of the operator. All parts of the machinery are conveniently located for oiling, and for making necessary renewals or repairs.

Last, but not least, we make a **Centrifugal Sand Mixing Machine** which has literally worked a revolution in the method of preparing facing sand, molding sand and core sand in foundries wherever it has been introduced. "THE FOUNDRY" for April contains a list of a few of the recent purchasers of this remarkable labor saver in mixing sand, as well as improver of molding sand.

To those who are sufficiently interested in what we have here said to wish to know more, we will be pleased to send on application, illustrated booklets describing our jib and traveling Cranes and Centrifugal Sand Mixing Machine.

Over 15,000 in Use.

ALWAYS READY!

800 TO 2,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y, & Treas.

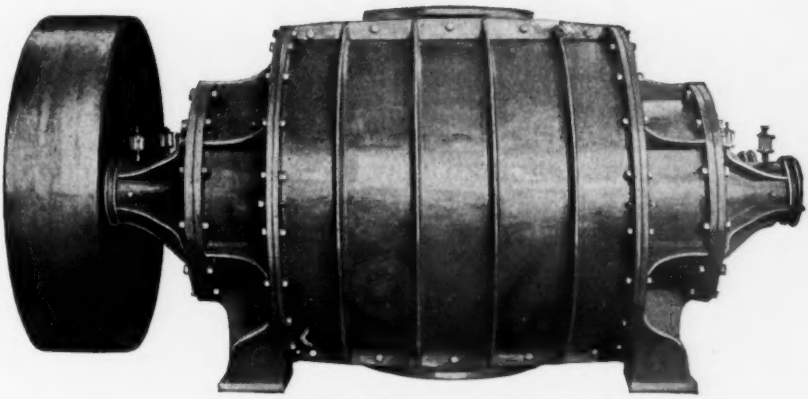
REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

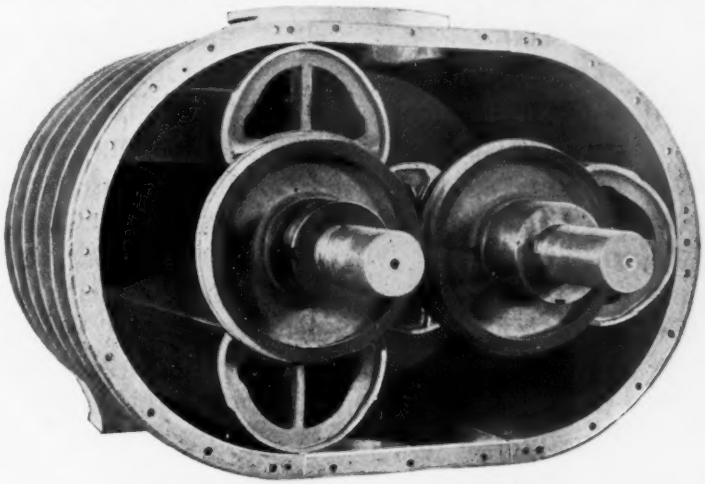
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

Smooth-On Cements

In up-to-date foundry practice, the time has come when the intelligent use of an iron cement that will withstand fire, water and steam and stay where it is put, has become a shop necessity. A blemish on an iron casting may not injure it, but like a wart on a nose it looks ugly and should be removed. Just here is where Smooth-On Castings is valuable to the manufacturer in saving good castings and to the consumer in avoiding delays in procuring them. Don't use an inferior filling because it is cheap, to do so is neither wise nor economical. Use only the best. Then with an expert, whose good judgment in the use and skill in the application, Smooth-On Castings saves time and money. Smooth-On Castings is useful for many other purposes, daily new uses are being discovered for it.

We make a Smooth-On Compound for Engineers and Steamfitters use, for making connections to withstand high temperatures and high pressures. Unequaled for making Flanged Joints and Boiler Patching.

We also make a special cement for connecting coils, for ammonia machines, for refrigeration. Write for Catalogues and Prices.

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

547-549 COMMUNIPAW AVENUE. JERSEY CITY, N. J., U. S. A.

JOHN G. O'NEIL, MANAGER CHICAGO OFFICE, 335 THE ROOKERY.

SOLE MAKERS OF

The Patent Improved Rib Flask

SPECIAL SIZES

PLAIN AND BEVEL
FLASKS TO ORDER

A LARGE STOCK OF STANDARD SIZES ON HAND

Our Latest Improved
Flasks have no Equals
in Finish and Efficiency

STANDARD SIZES IN STOCK.

LARGE SIZES MADE TO ORDER.

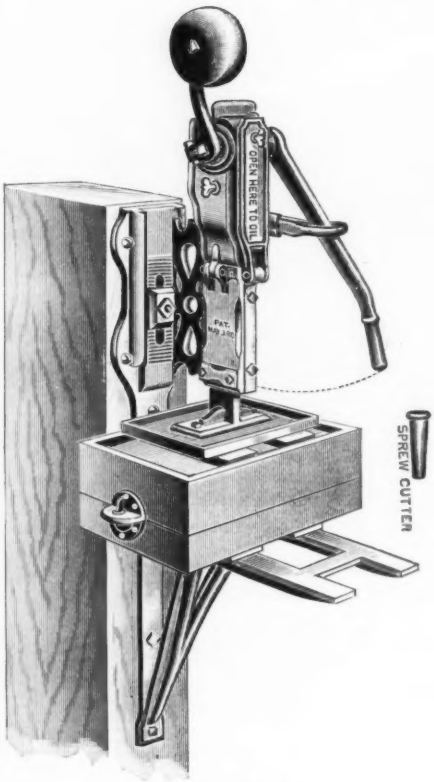
Brass Founders Supply Co.

NEWARK, N. J., U. S. A.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

ROOTS'

BLOWERS

There are Brier ROOTS
Cube ROOTS
Square ROOTS

BUT ONLY ONE

P. H. & F. M. ROOTS

ALWAYS THE STANDARD.
OTHERS IMITATE, BUT NEVER EQUAL.

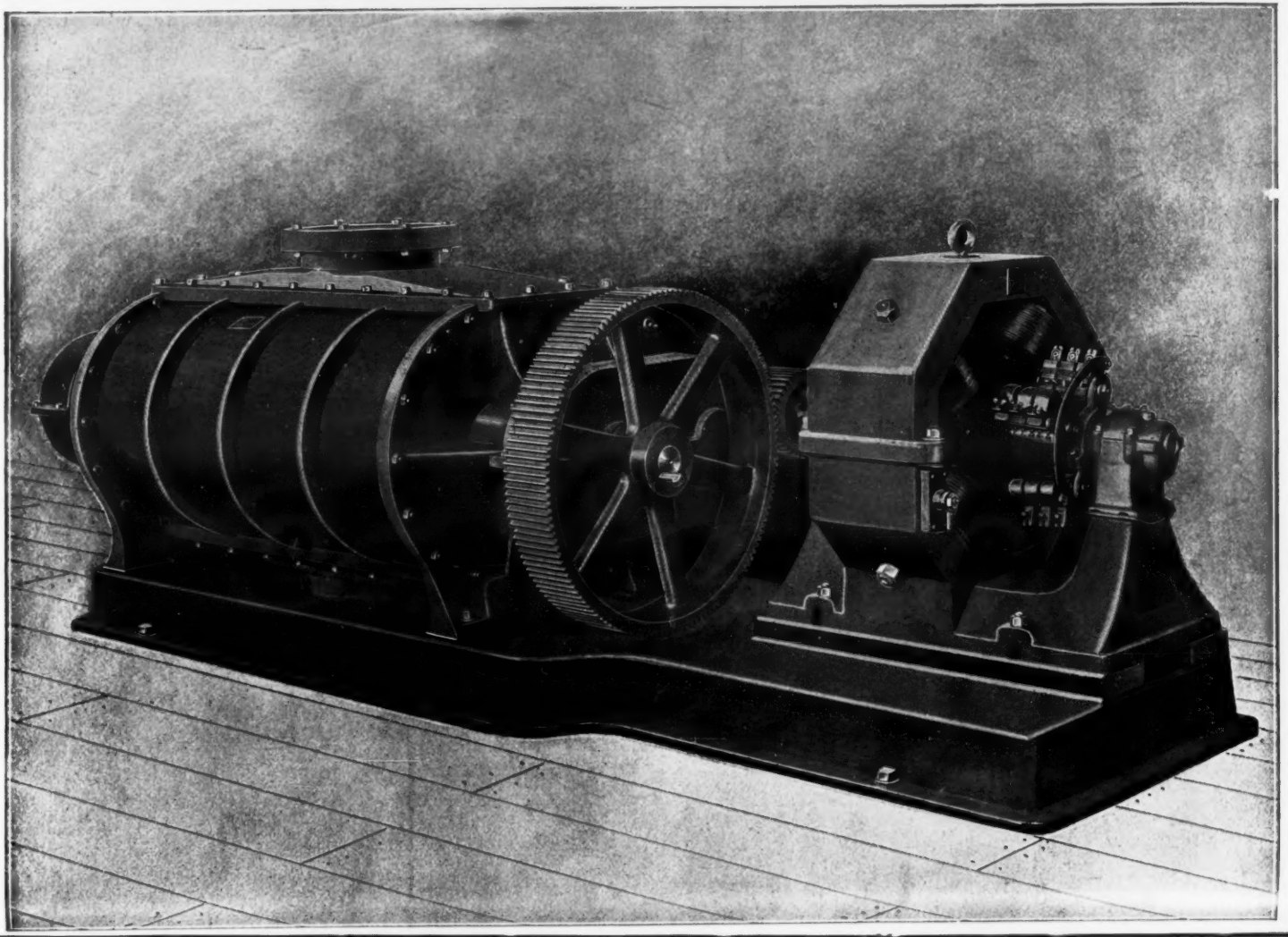
Forty years' experience boiled down to the most modern *Pressure Blower* in design and workmanship.

THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot.

P. H. & F. M. ROOTS CO.,

109 LIBERTY ST., NEW YORK. CONNERSVILLE, IND.

CHICAGO OFFICE:—1538 MARQUETTE BUILDING.



ZANESVILLE MOLDING SAND

Needs no introduction. It has the **COLOR** that tells. You are sure to get **SMOOTH CASTINGS** with **ZANESVILLE SAND.** The freight rates are always low because we are located on Penna. Lines, B. & O., W. & L. E., C. A. & C., O. & L. K., C. S. & H. and B. Z. & C. Railroads, and they are all after the business. Wet weather is coming and cars will soon be scarce. Let us quote you prices on your season's supply **NOW.**

The McKinney Sand & Clay Co.

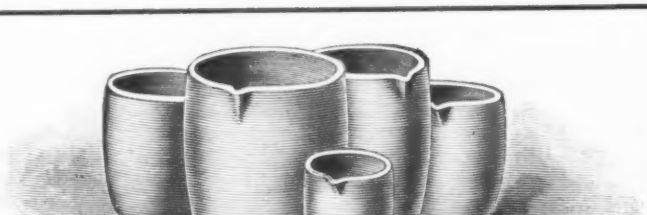
ZANESVILLE, OHIO.

LONG DISTANCE TELEPHONE CONNECTION

BRIDGEPORT CRUCIBLE CO.

—MANUFACTURERS OF—

Black Lead Crucibles



Climax Furnace Clay

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U. S. A.

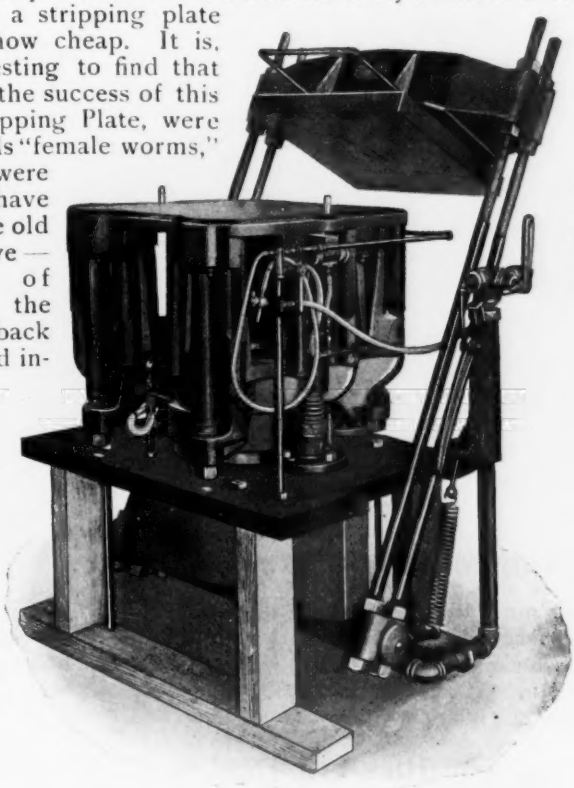
A Bit of Molding Machine History.

The first U. S. Patent for any kind of a Molding Machine was issued early in 1852 to a man named Satterlee, and it was quite a machine—seems to have been in appearance about half way between an eight day clock and a cider press—had "wheels"—of odd kinds, gear, sheave and sprocket, had pitman, levers, pawls, counterweights, chains and toggles—more gear than Kipling put into McAndrews Hymn.

All this mechanical uneasiness was to accomplish what the inventor called "the said work of sifting, filling and pressing."

Thus he omitted from the functions of a machine like a perfecting press and costing almost as much, the drawing of the patterns, the ONLY thing that some foundrymen are today buying $50 machines to do, on each of which they spend upwards of $1,000 for stripping plates and patterns. Satterlee was evidently ahead of his age in the U. S., for in England the very first idea of a molding machine, patented by one Maullin in 1800, was in effect nothing but a Stripping Plate—like some of our machines today—the $50 for machine, $1,000 for patterns kind. Maullin's machine molded screws (gimlet pointed too!), but even he in 1800 would probably have known better than to try to mold a lock case or a flat bevel gear with a stripping plate rig, no matter how cheap. It is, moreover, interesting to find that contributing to the success of this George 3rd Stripping Plate, were what Maullin calls "female worms," which, if they were not nuts, must have been limbs of the old temper of Eve—which would of course carry the Stripping Plate back before Noah, and indicate that some of its family came through in the Ark.

The Stripping Plate still has its uses—in bad company—and we still use it when it is insisted upon, but only four times since 1895.



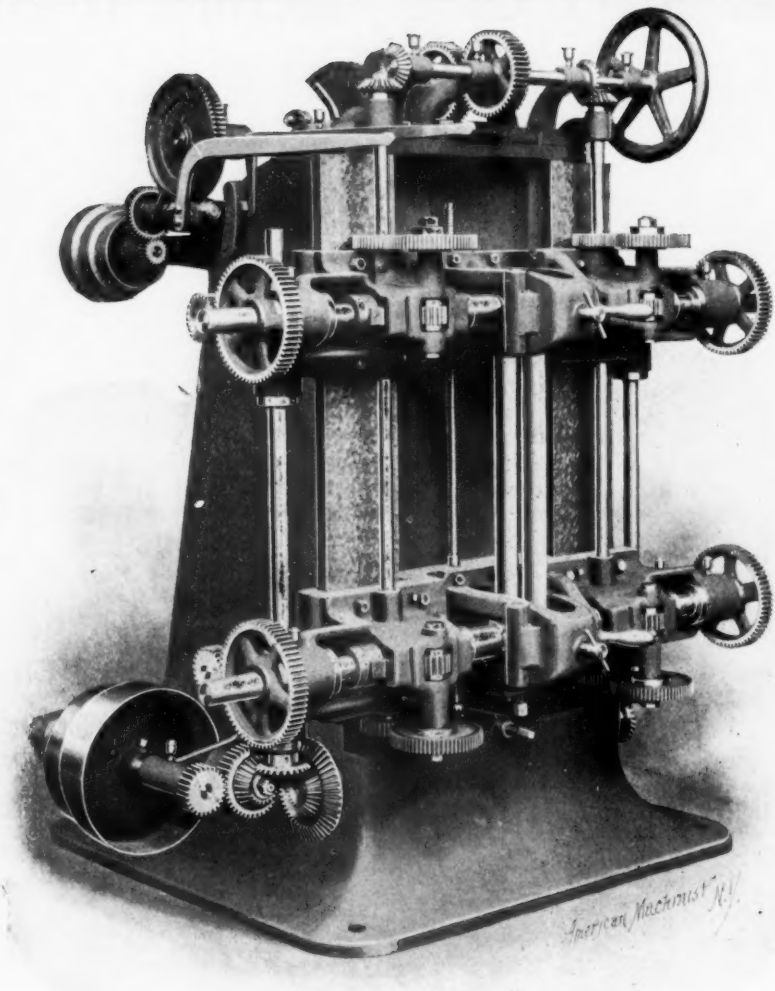
This is a Vibrator Molding Machine for Flasks 26x26.

Has 12" Draft and Power Ramming.

The Tabor Mfg. Co.

ELIZABETH, N. J.

Schuchardt & Schutte, Berlin, Germany. *James Hartley & Co., of Manchester, Ltd., Manchester, E*



It's volume of work nowadays

that brings profits. Our four spindle radiator drill will bore and face 600 loops per day. Entirely automatic. Operator has only to put in and take out work. We also build four and six spindle heater section drills, besides a large variety of radial and multiple drills. Catalog on request.

The Bickford Drill & Tool Company,

Cincinnati, Ohio, U. S. A.

Foreign Agents:--Schuchardt & Schutte, Berlin, Vienna, Cologne, Brussels, Stockholm, St. Petersburg. Charles Churchill & Co., Ltd., London, Birmingham, Manchester, Glasgow. Adphe Janssens, Paris and Brussels. F. W. Horne, Yokohama, Japan. A49

PNEUMATIC RAMMER

A PERFECT SUCCESS AS A MACHINE.

A PERFECT SUCCESS AS A MEANS OF SAVING TIME, MONEY AND METAL IN THE FOUNDRY.

IN THE FIRST PLACE you can do heavy molding in one quarter the time required for hand ramming, **and one man can work it.**

IN THE SECOND PLACE, the mold will be rammed harder and more uniformly thus preventing "straining" and consequent loss of 10% to 20% of metal.

MADE IN THREE SIZES.

Small size for hand use. Large sizes for suspension from crane.

Easily and quickly put up and moved about over the work.

A great labor saver in **Pipe Foundries.** Special attachments for this work.

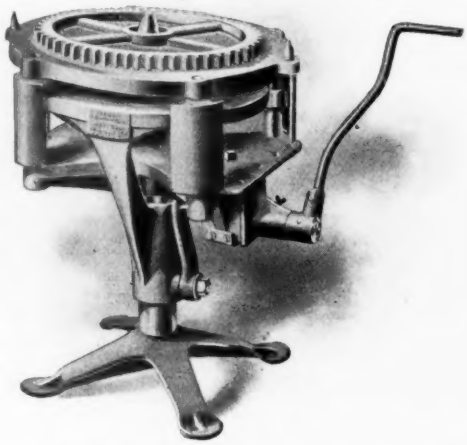
When the Casting cools off use our Pneumatic Hammer for Chipping. All sizes.

PHILADELPHIA PNEUMATIC TOOL CO.,

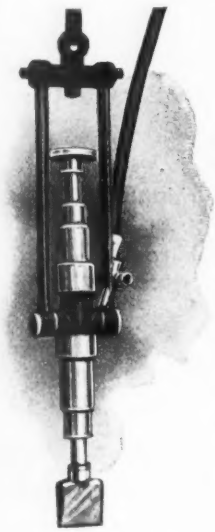
NEW YORK.	PHILADELPHIA.	PITTSBURG.
149 Broadway.	21 So. Twelfth St.	Wood and Water Sts.

COMPETITION

is getting stronger. The high prices of six months ago, with plenty to do for everbody, are gone. Whether you are making castings for yourself or for the use of others you are interested in turning out the best of work at the lowest cost. Everybody concedes that machine molded castings are more perfect than those made by hand. We can show you hundreds of places where the cost of molding has been reduced by more than half. Send us a sketch or sample casting of the jobs on which competition is crowding you hard. We can help you. The strong point in favor of the molding machines **WE** build is that they are made to order only, and consequently fit the jobs made on them.



In connection with our machines you want the :: :: :: :: :: ::



PATENT APPLIED FOR.

Maywood Sand Rammer

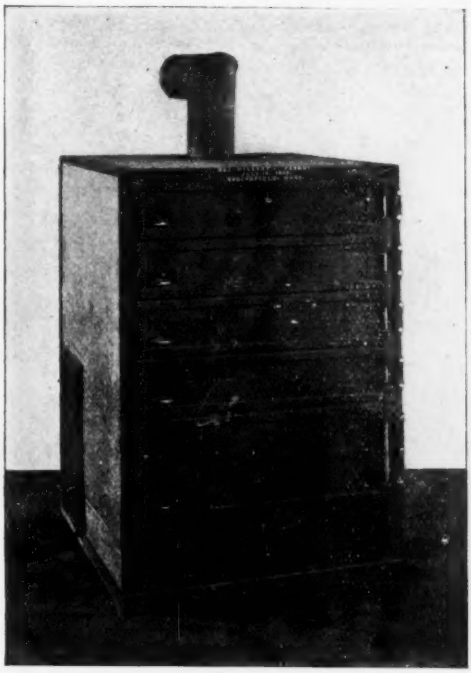
OPERATED BY COMPRESSED AIR

It is the **First Successful** Pneumatic Rammer placed on the market. It comprises both the butt and pein ramming ends, and may be reversed at pleasure during operation. The operator can tuck the corners of his mold, or around bars in the flask, and the Rammer works with equal facility at any angle. This Rammer in actual operation enabled the operators to turn out a complete mold (cope and drag 14x22), put the required facings on the molds and close them at the rate of **One a Minute.**

GIVE US A CHANCE NOW AND BE READY FOR NEXT SEASON

Maywood Foundry and Machine Co.

MAYWOOD, ILL.



Argument Alone

May not be sufficient to convince you that you should not attempt to run your foundry without a

MILLETT CORE OVEN

For this reason we have had printed a list of the principal concerns throughout this country and Europe who have them in use. We shall be glad to send this to you. We will not talk about the money making points of the **Millett Core Oven** this month. All we ask you to do is to look up one in your vicinity, examine it, see the work it does. You will not be long in making up your mind to give us an order for one or more.

The Millett Core Oven
Means Perfect Cores...

Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

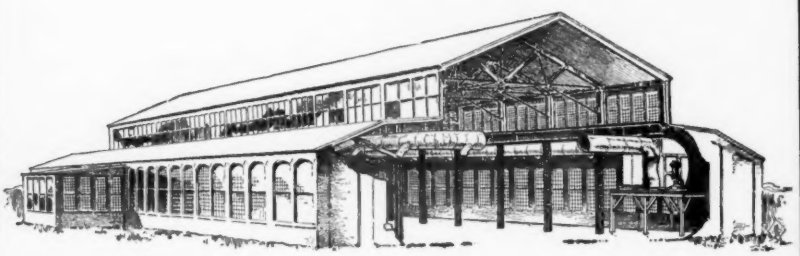
On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

HEAT YOUR FOUNDRY

BY THE

BLOWER SYSTEM

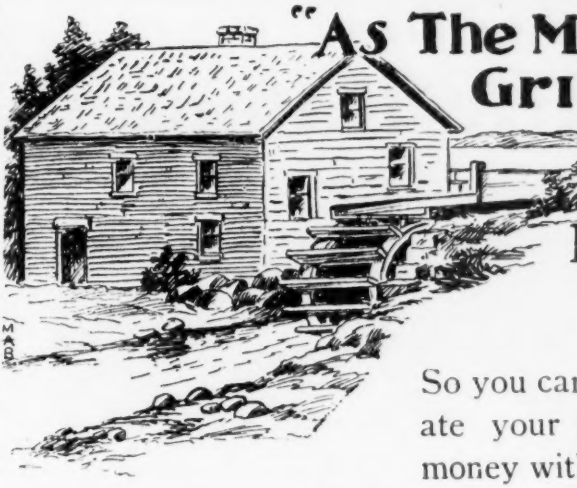


ALL HEATING SURFACE IS MASSED IN CONNECTION WITH THE FAN WHICH DRAWS THE AIR THROUGH AND POSITIVELY FORCES IT TO ALL PARTS OF THE BUILDING. VENTILATES AS WELL AS HEATS.

B. F. STURTEVANT CO. BOSTON

NEW YORK PHILADELPHIA CHICAGO LONDON

107



"As The Mill Cannot Grind With The Water That Is Past"

So you can no longer operate your shop and make money with any job lot of old appliances those before you may have left. Did you ever stop and figure up what it costs you a year to get your stuff in and out of the foundry? Count it all up—castings going out, flasks being shifted from one place to another, molding sand to carry in. Seems just like quite a few people were doing nothing but handling freight. In the afternoon when a heat is being taken off everybody is tuckered out lugging hot iron from one end of the shop to the other. All of this work you can do with about half the force you have now got by installing a **Coburn Trolley Track.** It will make work easier for your men and more money for you. The **Coburn** is the simplest and most efficient Trolley Track. It lasts a lifetime. Its first cost is low. Won't you write for some printed matter on this subject?

Coburn Trolley Track Mfg. Co.

HOLYOKE, MASS. U. S. A.

"LITTLE GIANT"

Pneumatic Hammers

ARE ESPECIALLY DESIGNED FOR CHIPPING CASTINGS.

LIGHT. SIMPLE IN CONSTRUCTION.

DURABLE. EFFICIENT.

They have an air regulator which can be so adjusted as to admit a minimum amount of air and yet deliver a blow with full force of hammer under various pressures.

MADE IN ALL SIZES. Used in Foundries throughout the World.

SENT ON TRIAL. Guaranteed Against Repair for One Year.

SEND FOR CATALOGUE.

Standard Pneumatic Tool Co.,

Manufacturers Piston Air Drills, Boring Machines, Reversible Motor Chain Hoists, and all kinds of Pneumatic Tools and Appliances.

Main Office and Works, CHICAGO, U. S. A.

NEW YORK. LONDON. PARIS. BERLIN. ST. PETERSBURG

Every Foundry is Losing

Money if it tries to turn out castings with sand that is unsuitable. Much is claimed for facings but facings will not make a nice casting unless the mold is made from the right sand. Good sand is the foundation for good castings. If you have been worrying along with a poor grade let us send you a carload of the famous **ZANESVILLE.** When that is gone we will not have to ask you to order another one.

We have been digging molding sand right here in Zanesville for more than twenty years. We know what grade is suited to your work. There will be no experimenting if you leave the selection to us.

You had better figure up to-day how much you will need to carry you through until next summer. Better give us the order right away too, so that we can ship you nice dry sand. We know you dislike to pay freight on water.

E. M. AYERS,

ZANESVILLE, OHIO.

WESTERN REPRESENTATIVE:

H. S. VROOMAN, 220 West 20th St., CHICAGO, ILL.

Cherry Valley Iron

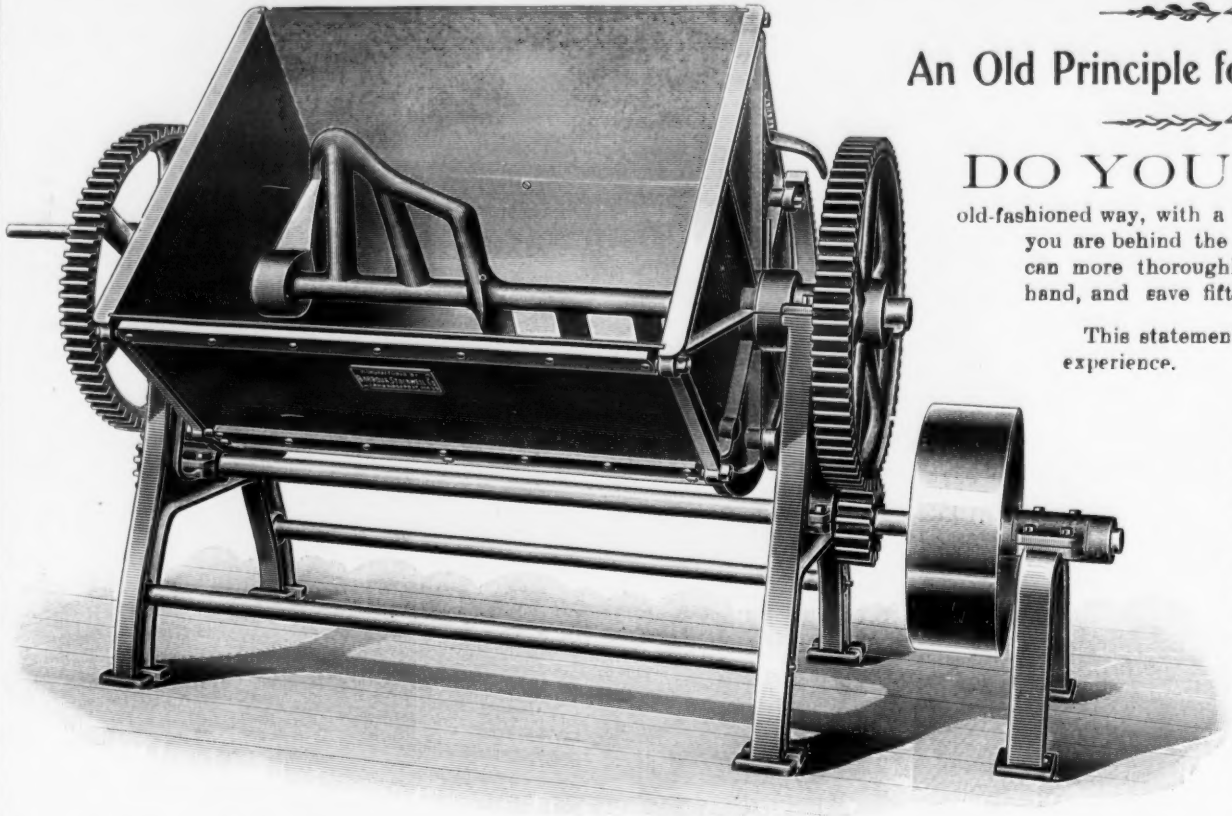
MAKES Castings that are strong, at the same time easily machined. It is an iron that will retain your old customers, secure new ones, and keep everybody satisfied. :: ::

ORDER A CARLOAD OF **Cherry Valley** TO-DAY

Cherry Valley Iron Co.

Murtland Building, **PITTSBURG, PA.**

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

DO YOU mix your facing sand, core sand, fire clay, etc., in the old-fashioned way, with a laborer and a shovel? Then you are behind the times. With this mixer, you can more thoroughly mix it than is possible by hand, and save fifty per cent. of your labor.

This statement can be verified by actual experience.

The material is shovelled into the machine or fed in through a hopper, after riddling. The machine is then started, and in five minutes the mass is perfectly mixed. Turning a crank at the side cants the machine and empties the material either on the floor or into a receptacle provided

Capacity, 250 lbs. every five minutes.

Pulley, 24 in. diam. x 6 in. face.

Floor Space, 7 ft. x 3 ft.

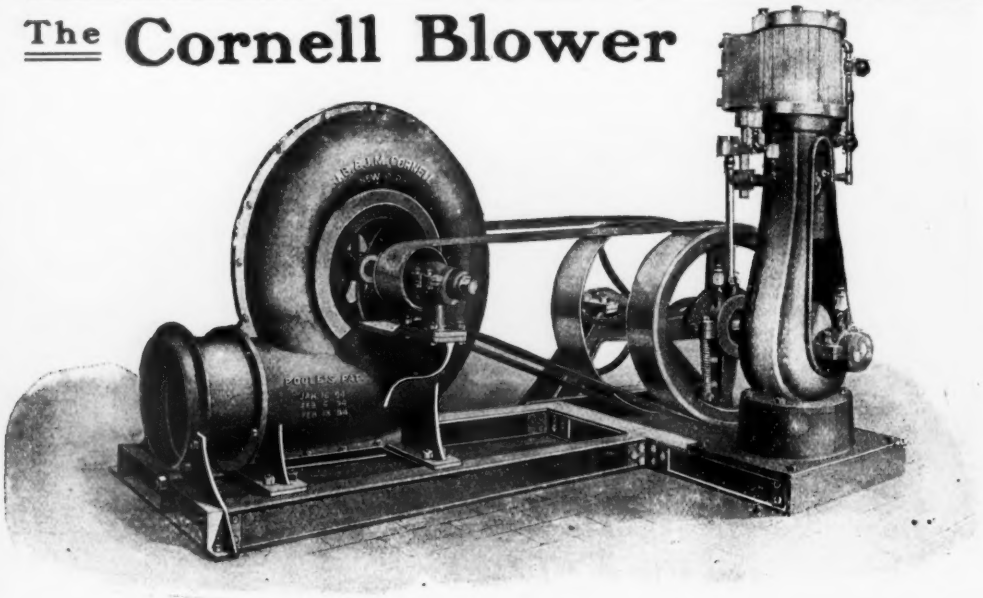
Speed of Pulley Shaft, 125 revolutions.

Weight, 1250 lbs.

For further particulars, write

BARBOUR-STOCKWELL CO., 205 BROADWAY, CAMBRIDGEPORT, Mass.

The Cornell Blower



THEY DO THE WORK

NEW AMSTERDAM GAS COMPANY.

340 Third Ave., NEW YORK CITY, July 10th, 1900.

Messrs. J. B. & J. M. Cornell, 26th St. and 11th Ave., New York City.

Dear Sirs:—I take pleasure in stating that the two large steel blowers which you furnished for our Ravenswood Works have given us great satisfaction. They do the work for which they were designed with comparatively little noise and run smoothly. They are well made and I am satisfied will be durable. We hesitated some time before giving this order, believing that your experience was not sufficient to give us what we desired, as our specifications were rigid and the requirements severe, but I have no reason to regret having placed the contract with you and I hope to be able to do business with you in the future. Yours very truly,

ALTON S. MILLER, Chief Engineer.

THEY RUN SMOOTH

G. C. KRUEGER DRYING COMPANY.

134-148 LAFAYETTE STREET, NEWARK, N. J., July 24, 1900.

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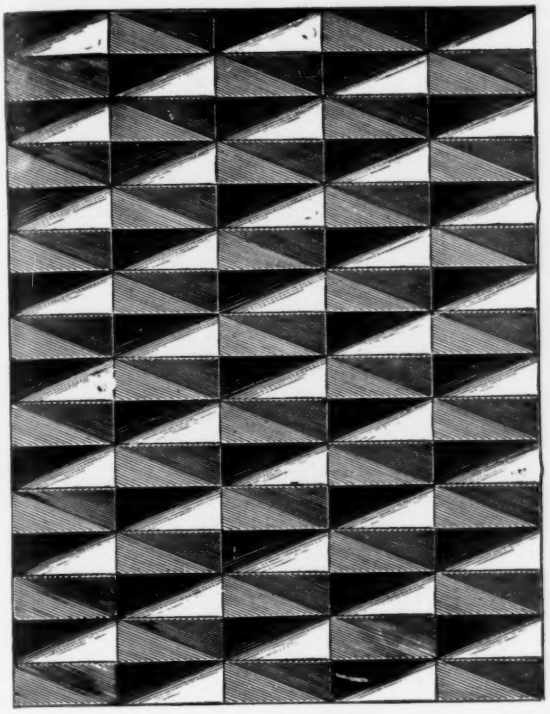

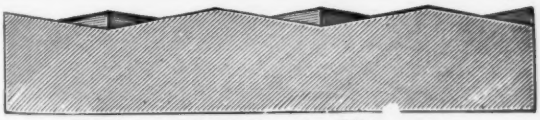

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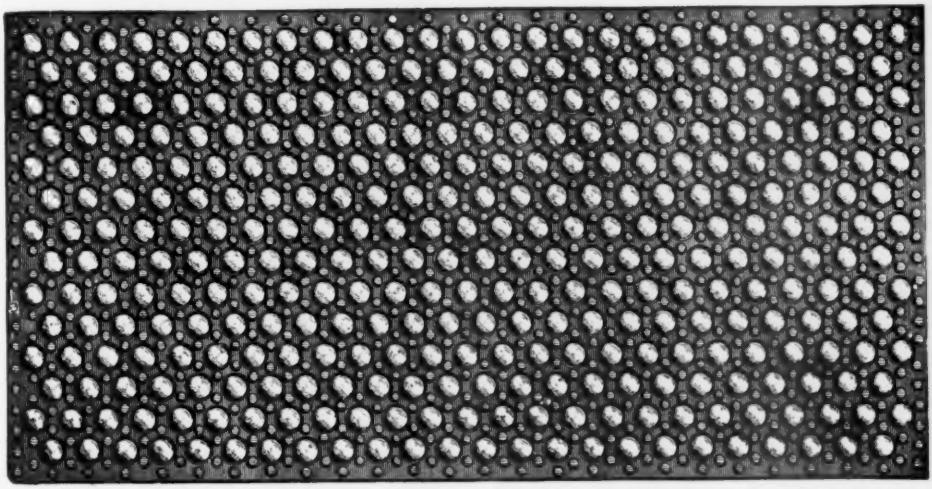

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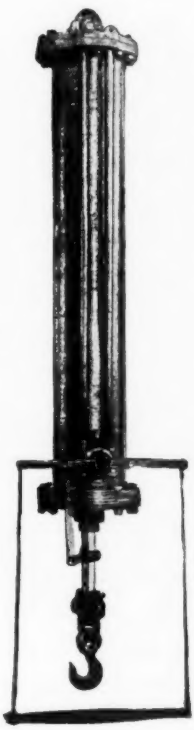

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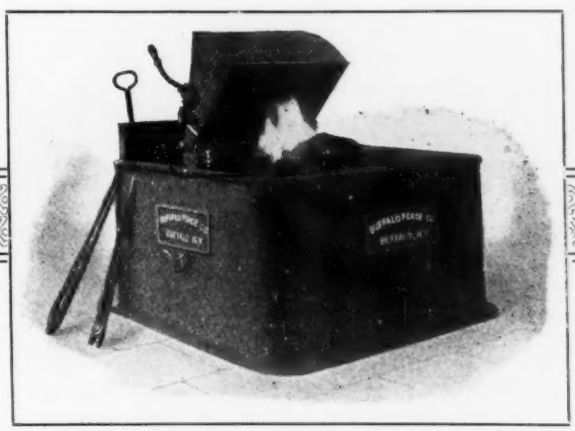

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Alphabetical Index to Advertisers.

Adams Co., The 42
Adams & Co., H. W. 42
Addy & Co., Matthew 42
American Bridge Co. 8
American Glutrose Works 50
American Machinery Co. 37
Ajax Metal Co. 40
Ayers, E. M. 25

Barbour-Stockwell Co. 27
Barnard & Leas Mfg. Co. 46
Barnett Foundry Co. 47
Bickford Drill & Tool Co. 18
Brass Founders' Supply Co. 15
Bridgeport Crucible Co. .....Colored Insert
Brown Bros. 29
Buffalo Forge Co. 33

Carborundum Co. 48
Case Manufacturing Co. 43
Cherry Valley Iron Co. 26
Chicago Pneumatic Tool Co. 7
Chisholm & Moore Mfg. Co. 46
Church, S. R. .....38, 41 and 42
Clayton Air Compressor Co. 37
Cleveland Facing Mill Co. 6
Clinton Iron & Steel Co. 35
Coburn Trolley Track Co. 23
Connersville Blower Co. .....Back Cover
Cornell, J. B. & J. M. .....28 and 47
Cowles Electric Smelting and Aluminum Co., Inside Back Cover

Dayton Coal & Iron Co. 42
Decamp Bros. & Yule 42
Diamond Machine Co. 37
Dixon Crucible Co., Joseph 5
Domhoff & Joyce Co. 42

Fallis & Co. 50
Fanner Mfg. Co. 49
Fox Machine Co. 46

Garden City Sand Co. 51
Gobeille Pattern Co. 38
Goodrich & Co., F. A. 42
Gould & Eberhardt 38

Hanna & Co., M. A. 42
Heyl & Patterson 40
Hillman & Co., J. H. 42
Holmes & Co., F. B. 38
Hunt Co., C. W. 44

Jacobson, A. M. 41

Keep, W. J. 45
L. & N. Ry. 49
Mack, Thomas 45
Maurer & Son, Henry 38
Maywood Foundry & Machine Co. 50
McCormick Co., J. S. 51
McCullough Dalzell Co. 51
McKinney Sand and Clay Co. .....Colored Insert
Millett Core Oven Co. 21
Mohr, J. J. 43

Northern Engineering Works .....35 and 48

Obermayer Co., The S. .Front Cover and Page 1

Paxson Co., J. W. .....2 and 3
Philadelphia Pneumatic Tool Co. 19
Pickands, Brown & Co. 35
Peirson & Co., C. L. 43
Pilling & Crane 43
Presbrey Fire Brick Co. 39
Pridmore, Henry E. 44

Ridgway & Son Co., Craig 10
Rogers, Brown & Co. 43
Roots Co., P. H. & F. M. Colored Insert, between 16 and 17

Scioto Star Fire Brick Works 39
Sellers & Co., Wm. 11
Smith & Co., A. F. 39
Smith Foundry Supply Co., J. D. 30
Smooth-On Manufacturing Co. 14
Standard Pneumatic Tool Co. 24
Staten Island Clay Co. 39
Stevenson, Field & Co. 43
Stover Manufacturing Co. 45
Stow Manufacturing Co. 41
Sturtevant Co., B. F. 22
Superior Charcoal Iron Co. 35
Syracuse Chilled Plow Co. 50
Syracuse Malleable Iron Co. 16

Tabor Manufacturing Co. 17

Vrooman, H. S. 39

Washington Coal & Coke Co. 9
Wells Light Manufacturing Co. 12
Whitehead Bros. Co. 4
Whiting Foundry Equipment Co. 32
Wilbraham Baker Blower Co. 13

CONTENTS.

Trade Outlook 1
Kranks' Korner 1
National Cash Register Co., Illust. 2
Mixing Irons—Edward Kirk 11
Debatable Points in Cupola Practice—Alex. Moore 13
John W. Duntley, Illust. 14
Experience of a Foundry Fireman—Benj. D. Fuller 16
Different Ways of Working—Thos. A. Haigh 17
Gould & Eberhardt Sand Sifter, Illust. 17
Some Corliss Cylinders, Illust.—J. S. Stirling 19
Old and New in Iron Making 22
Design and Shrinkage—John Wilson Brown 23
Closing Cracks in Cast Iron Cylinders. 23
Attaching Cogs of Gear Patterns, Illust. 23
Shrinkage and Blowholes—A. W. Pearson 25
Foundry Chemists—Chas. H. Vannier 26
Necessity is the Mother of Invention, Illust.—W. H. Fonda 26
Oliver Band Saw, Illust. 27
Allis Mutual Aid, Illust.—Ed. B. Gilmour 27
Deaths 29
Personal 29
Paxson-Brown Oil Furnace, Illust. 30
The Flux Fake—N W. Shed 31
Cast Iron Notes—W. J. Keep 32
Cleveland Molders' Strike 33
Fires 37
Among the Foundries 37
History of Connellsville Coke—F. C. Kieghley 38
Casting Gears in Baked Molds—D. A. Potter 42
Beer Causes Trouble 43
Southern Iron Industry 43
A Common Complaint 44
Brick for Foundry Floors 44
One Reporter's Idea 44

Three Motor Electric Traveling Crane—Type 105.

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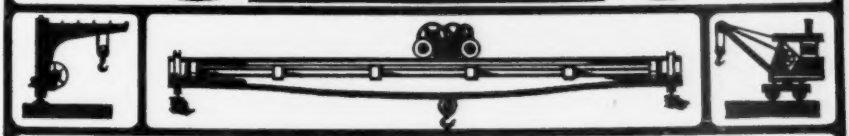

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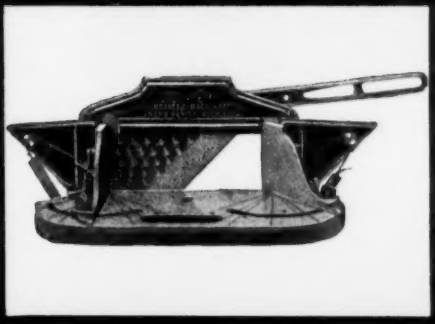

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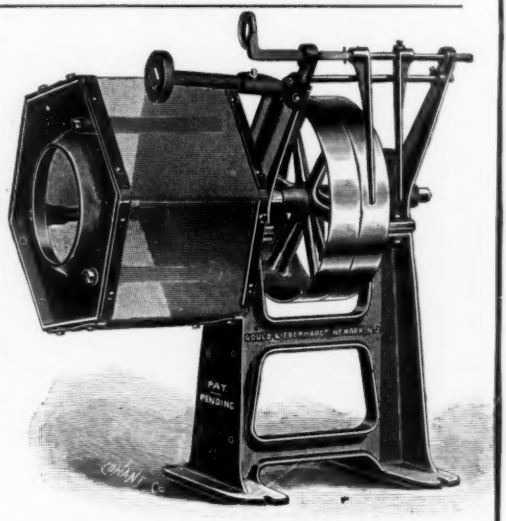

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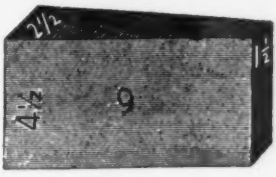

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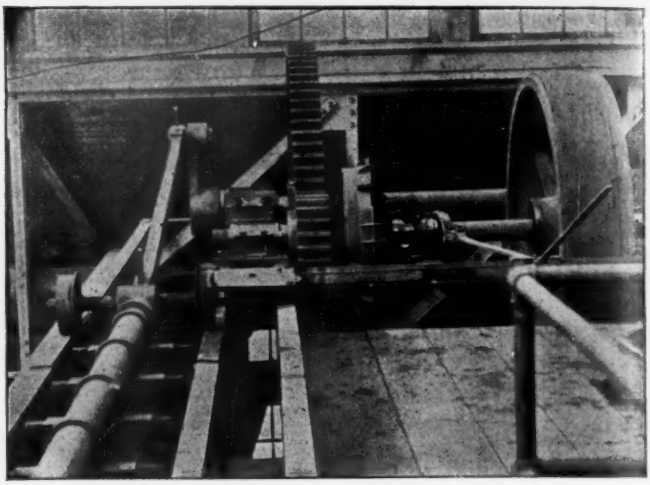

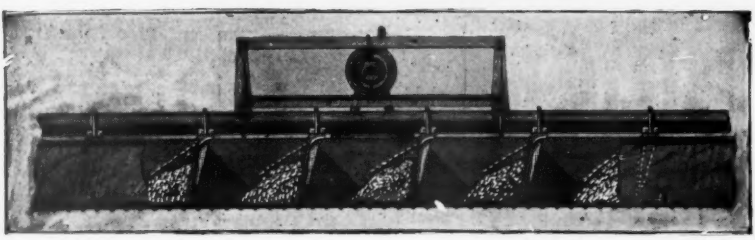

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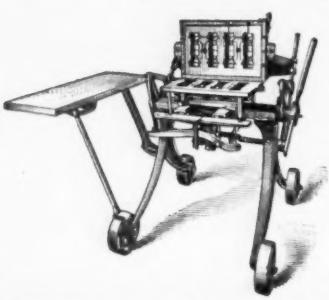

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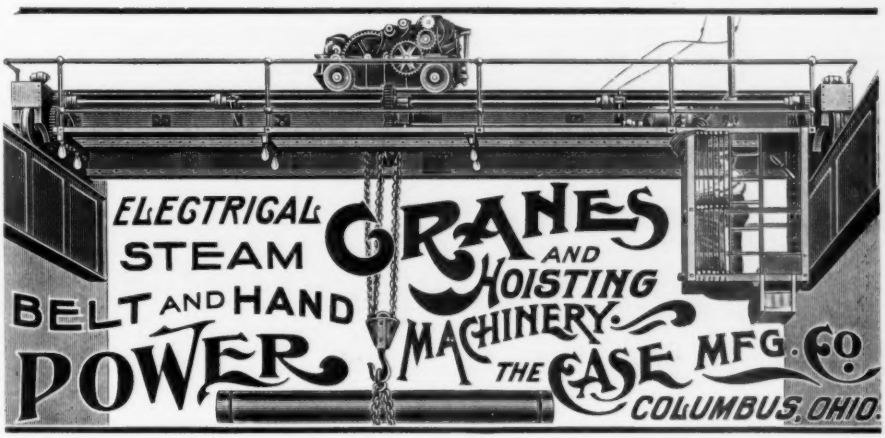

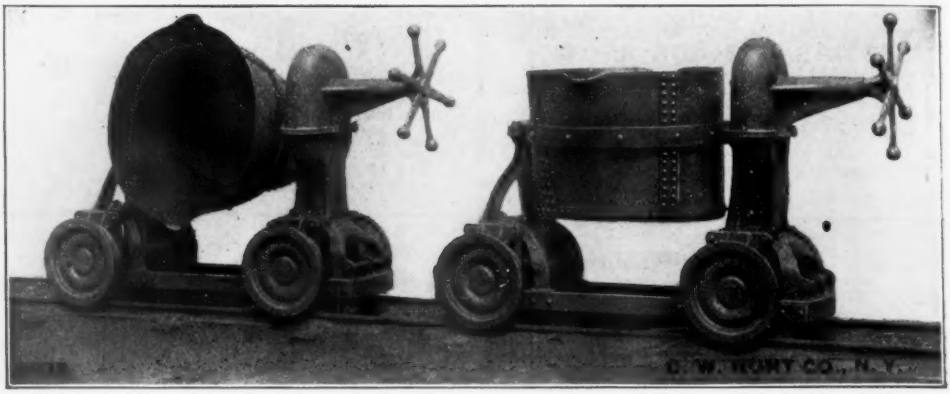

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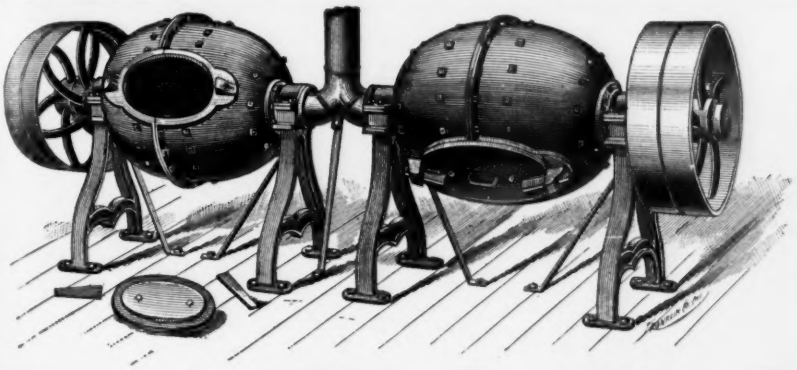

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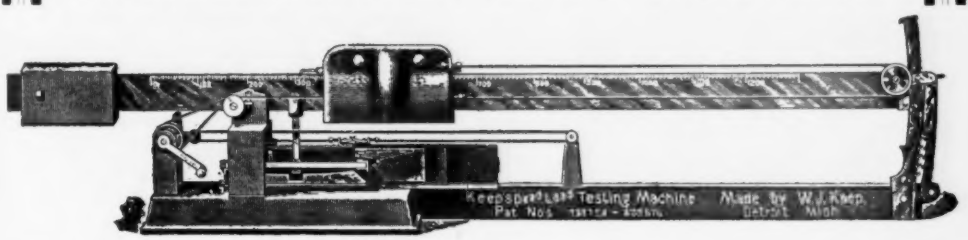

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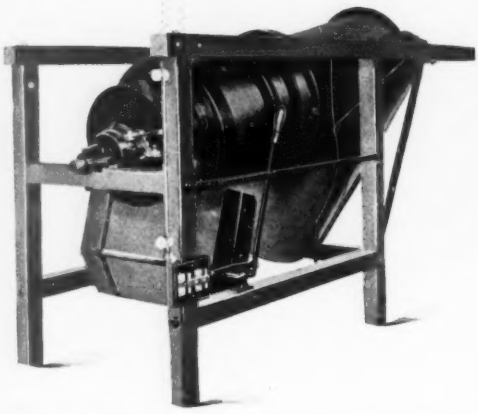

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Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months. ::

MOLINE PLOW CO., Agricultural Implements
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Replying to your request for report on Magnetic Separator bought of Messrs. Barnard & Leas I have to say: It separates practically every scrap of iron from the cinders, is simple in construction and operation, and the only wearing parts so far as I can see are the oiled bearings on which it revolves. We first crush our cupola cinders in a tumbling mill, extracting iron as usual in this way. The dust that passes out between staves of mill is then passed through the Magnetic Separator. Before getting the latter into operation we had accumulated a large pile of dust which was apparently free from iron. From this, one laborer has gotten from 2000 lbs. to 2300 lbs. of iron per day of ten hours. I have seen many devices for extracting iron from cupola cinders, but never anything to approach this in thoroughness of work and economy in operation.

Respectfully, E. H. PUTNAM, Foreman.

Give this machine a trial. The saving will surprise you. Write for prices and discounts.

Barnard & Leas Mfg. Co.

Mill Builders and Mill Furnishers **MOLINE, ILL.**

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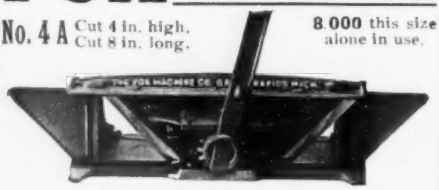
No. 4 A Cut 4 in. high, Cut 8 in. long. **8,000** this size alone in use.



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Interchangeable Steel Pins

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Our Testimonial. The Oscar Barnett original **<STANDARD> BEVEL FLASK,** our product the last fifty years, requires no ribs, sales increasing yearly. Why use inferior grades? We guarantee ours! Complete Equipment Catalogue for the asking.

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Makes cores that are perfect at a less cost than anything else on the market. Try it? No charge for sample delivered F. O. B., New York.

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We run the risk—if there is any. All we ask of you is that you shall make the trial. Our guarantee says:

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will save money to its users. That means that it will do more work, better work, faster work than any other abrasive.
If it doesn't, we are the losers.
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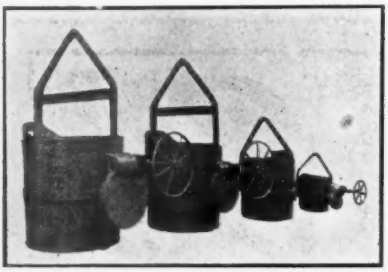

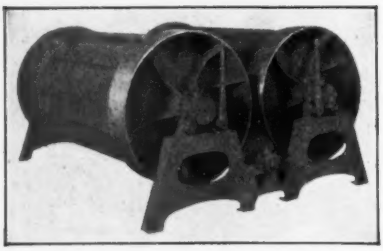

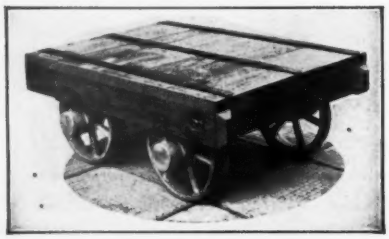

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Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

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The business has been established since 1868 and is in a paying condition.

A full chance is offered intending purchasers to investigate. Address,

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Leather and Wood Fillet

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Foundry Supply House PITTSBURG, PA.

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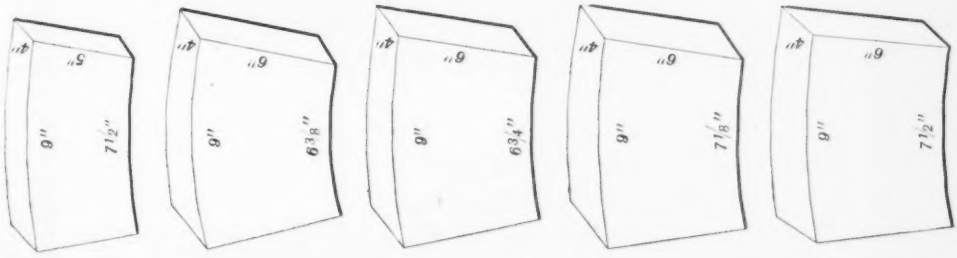
TO MAKE A TEST OF CUPOLA BLOCKS WOULD BE THE PRESENT



Why not learn whether you are wasting or saving money in the use of the brand you are now using. Let us furnish you a trial lot of **Dome Blocks.** We know we can save you money in first cost and furnish a Special Block, the very best obtainable. ***We are not guessing, we know it.*** **Our Molding Sand, Fire Clay, Loam, etc.,** are all first class. Can't we send you samples. :: :: :: ::

The **Garden City Sand Co.** 3 TELS. ALL M 4827. 188 Madison Street, CHICAGO.

Do not be a Factotum

The day for the man who does odd jobs, the Jack-of-all-trades, has gone by forever. There is no longer room for the smatterer, who can do a little of everything and not much of anything. Everybody wants the trained, educated worker, who can do one thing better than anybody else. The factotum is nearly always a failure. To be great one must concentrate. As competition becomes more intense, the demand for specialists, for experience, increases. Everywhere in the business and professional world there is a standing advertisement for the man who can do one thing efficiently, not many things indifferently.

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Let us have your order **today.**

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By using Good Facings and Blackings on the Mold. You don't have to spend a lot of money for cleaning Castings afterwards. This is a Fact.

To enable foundrymen at a glance to select the brands of facings or blackings best adapted to the size, nature and quality of castings they may have use for, we classify them as follows:

For Cast Iron, Gas and Water Pipe—Best Coke, Lehigh, Reliance and Charcoal.

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For Cores—Charcoal, Coke, Blackstone, Anthracite, Plumbago and Black Lead—Cranston-Peerless Perfect Wash.

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For Car Wheels—XX Mineral Reliance, Blackstone — Cranston and Special Car Wheel Facing.

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For Brass Castings—Charcoal, Carbon, India Silver Lead or Plumbago.

For Stove Plate and Piano Castings, Light and Heavy Facings are used as follows:—First or Heavy; Brilliant No. 2 Plumbago, Blackstone, Providence, XXX Heavy, Garland and North Carolina Lead. Light or Top or Return: National Return, Eagle Return, Phoenix or Carbonized Return and Charcoal and Peerless Return.

For Holloware Castings—Soapstone Talc and sometimes extra fine Sea Coal.

For Cannon or Cylinder Stoves and Kettles—Our celebrated Cannon Stove Facing applied with camel hair brush, and our Peerless Plumbago. Sometimes a mixture of Soapstone and Fine East India Plumbago. Sea Coal is also mixed with the sand.

Sea or Stone (Bituminous) Coal Facings are invariably used in machine foundries in addition to the blackings. The object of their use is to assist in peeling a casting as well as to vent a mold. They are mixed in with the sand.

For molds that do not require it, and, which it is neither desirable nor expedient to "slick," use Blackstone, North Carolina Lead, German Black Lead, Pure Mineral or Plumbago. After dusting the mold with any of these put down the cope. None of them will wash or run before the iron and the castings will "peel" without difficulty.

The S. Obermayer Co.

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The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

It keeps us hustling to fill the orders for these goods.

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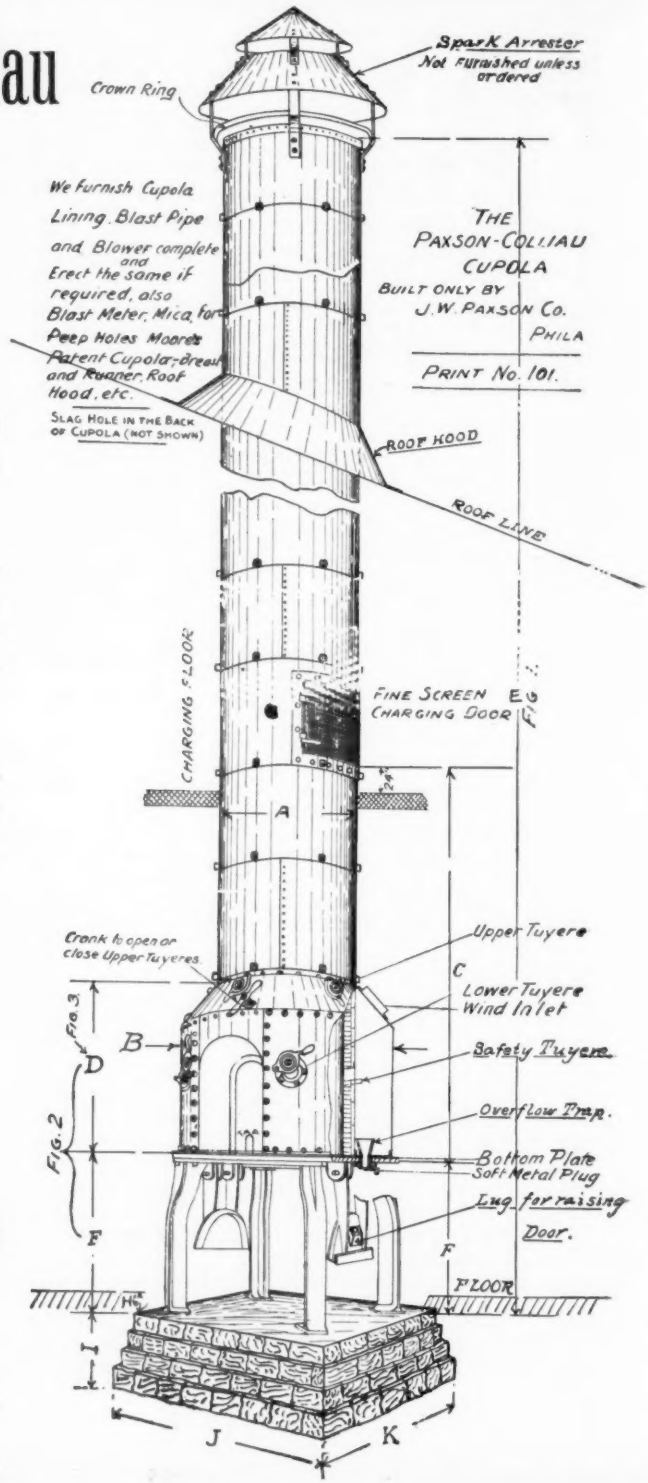
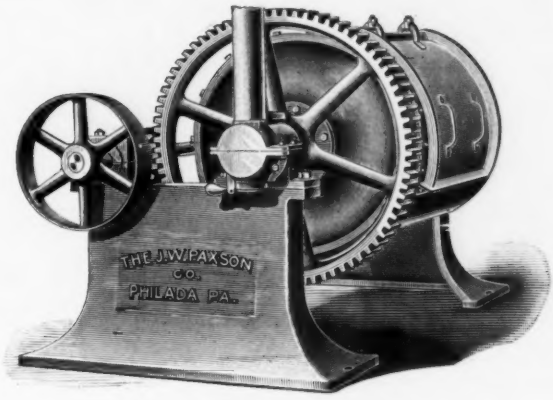


Paxson Exhaust Rumblers

MADE OF STEEL.



MADE IN SIZES:

18	inch	diameter,	any	length	from	24	inch	to	48	inch.
24	"	"	"	"		30	"		48	"
30	"	"	"	"		36	"		54	"
36	"	"	"	"		36	"		54	"
40	"	"	"	"		36	"		60	"

No Cast Iron Staves

BUT

One Solid Sheet of Steel.

Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors.

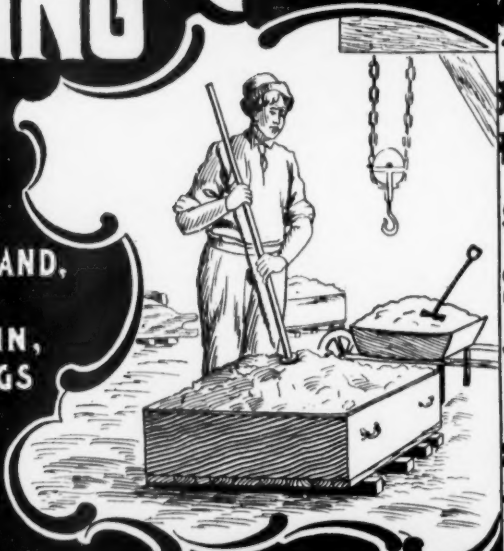
These are the best and most economical Rumblers ever made.

J. W. Paxson Co., 1021 North Delaware Avenue, PHILADELPHIA, PA., U. S. A.

WHITEHEAD BROTHERS COMPANY.

MOLDING SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.



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CRESCENT, N.Y.

It's UP TO YOU

WHETHER you will use poor substitutes instead of the genuine Dixon silver lead facings and blackings. :: A member of the American Foundrymen's Association at the June Convention said:

> "The blackings of the present day are composed to a great extent of common cement, pulverized anthracite, charcoal, soapstone and other cheap minerals, and it is a question if they do not cost more than they are intrinsically worth."

If you figure up how much longer it takes a molder to properly slick up a mold with a poor blacking—even if he can at all—you will probably find as others have that it will pay you to use one of the pure plumbago blackings made by Dixon. Castings are harder to clean with poor blacking. If the sand fuses it is due to poor blackings. Molder's extra time costs money. It costs more to clean castings than difference in price of blacking. Bad blackings make bad work and bad work often loses a customer. :: Every foundryman should strive to have his shop known for turning out the best work. :: If you will write us we think we can help you toward better work at less cost. :: "It's up to you."

Joseph Dixon Crucible Co.

JERSEY CITY, NEW JERSEY

C. F. M. FOUNDERS' PERFECT WASH

A FEW MORE
FOUNDRY SUPPLIES

CORONA PLUMBAGO

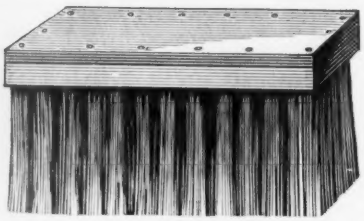


Fig. 17 in Catalogue.

Steel Wire Casting Brushes

ALL SIZES AT RIGHT PRICES.

The Cleveland Facing Mill Co.

FRANK H. CHAMBERLIN, Prop.

MANUFACTURE FOUNDRY { FACINGS SUPPLIES CLEVELAND, O.

Molders' Soft Brushes

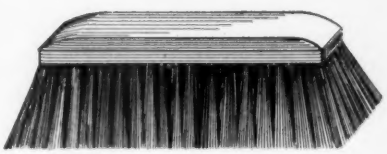


Fig. 28 in Catalogue.

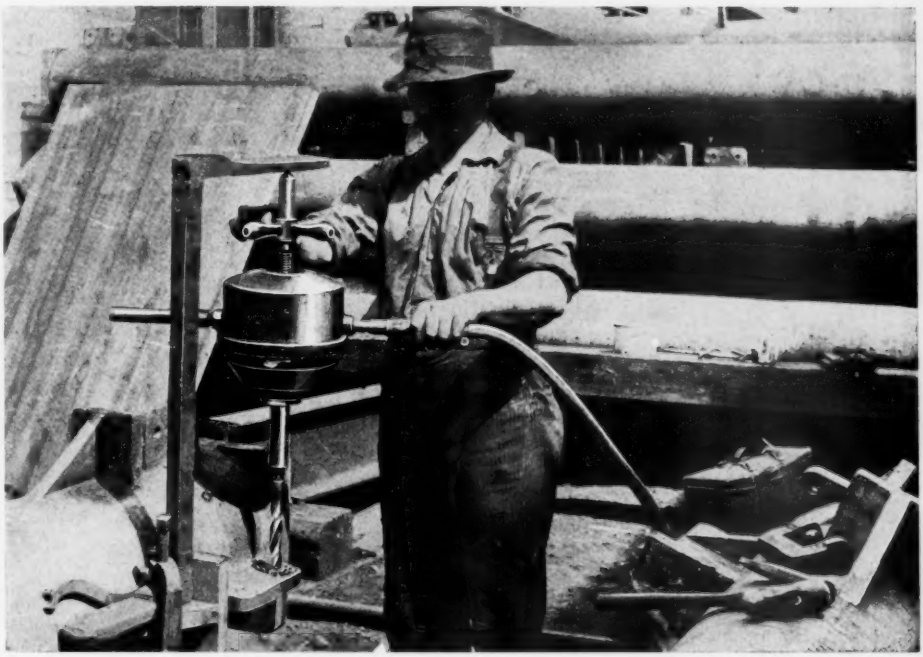
BLOCK 10X2 IN. BRISTLES 3 IN. LONG.

PERFECTION CORE BOXES

SEND FOR CATALOGUE

CUPOLA BLOCKS

CHICAGO PNEUMATIC TOOL CO.



Pneumatic Tools in designs and sizes for **Foundry Work.**
Our Customers say: "They go beyond guarantee."

One man does the work of four with our :: :: :: :: ::

Chipping Hammers

For drilling, reaming and tapping use our :: :: :: ::

AIR DRILLS . . .

They are especially valuable on heavy work not readily put under your drill press, and drill and ream up to 3 inches in diameter in iron and steel. :: :: :: :: :: ::

Air Compressors and Hoists

We send our tools on trial subject to approval. :: ::

New York Offices:
95 LIBERTY ST.,
NEW YORK.

General Offices:
MONADNOCK BLDG.,
CHICAGO.

AMERICAN BRIDGE CO.

GENERAL OFFICES

100 Broadway, NEW YORK, N. Y.

DESIGNERS AND BUILDERS OF
ALL CLASSES OF

Metallic Structures

WE have decided to carry a large stock at all our plants of Raw Material, from which we can furnish with great promptness any ordinary order for Steel Bridges, Roofs, Buildings, Columns, Girders, Beams, Channels, Angles, Plates, etc.

BRANCH OFFICES AND WORKS

BOSTON, MASS.	EAST BERLIN, CONN.	ALBANY, N. Y.	GROTON, N. Y.
ROCHESTER, N. Y.	BUFFALO, N. Y.	ELMYRA, N. Y.	HORSEHEADS, N. Y.
PITTSBURG, PA.	ATHENS, PA.	PENCOYD, PA.	PHILADELPHIA, PA.
TRENTON, N. J.	WILMINGTON, DEL.	BALTIMORE, MD.	COLUMBUS, O.
YOUNGSTOWN, O.	CANTON, O.	LAFAYETTE, IND.	CHICAGO, ILL.
MILWAUKEE, WIS.	MINNEAPOLIS, MINN.	NEW ORLEANS, LA.	

M. M. COCHRAN, PRES.
W. HARRY BROWN, V.-PRES.

JNO H. WURTZ, SECY.-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

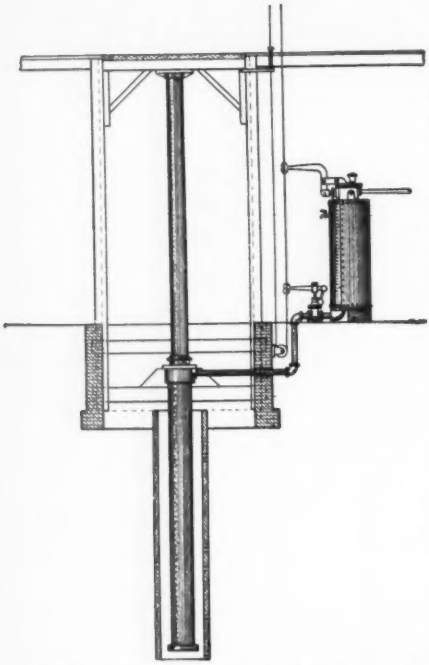
350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

THE OLD MAN WAS HOT



He had one of those screw elevators and right in the middle of a big heat the old thing went wrong, belt broke or something, and they couldn't get the stuff up to the cupola platform. The air was fairly blue!

No, we don't mean you; it was the other fellow. Your nice screw elevator, which you got so cheap, never gets out of order. But other people's elevators do, and that is why we are so earnestly telling about the Hydraulic Elevator which we make and which saves all bother and trouble of every sort—our Steam Hydraulic Elevator.

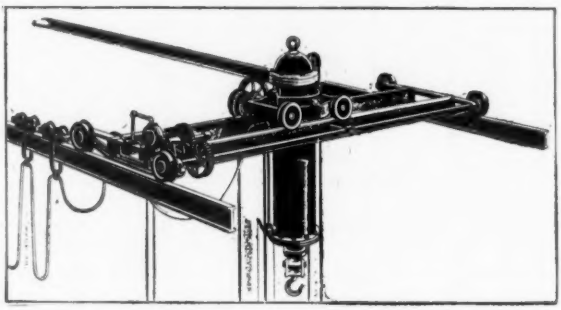
The Ridgway Elevator don't require any pump. Hooks right to the steam supply with just a piece of pipe. The chaps who test the Ridgway Elevator say that it uses 60 per cent. less steam than the Pump Hydraulic kind. But then you are not to pay any attention to the economy in steam part, since we don't sell our elevators on that, but entirely upon their inexpensiveness — that is, inexpensiveness as a hydraulic elevator. Our whole outfit don't cost much if any more than just the pump alone of the usual hydraulic. Besides, all the bother and crankiness of the pump is saved.

If you have occasion to install an Elevator you will put in the Ridgway Elevator if you know it.

HYDRAULIC AIR HOISTS

Only sort to get because they are perfectly controlled. A foundryman who gets any other sort fools away his money. So does the boiler maker and shape worker. Just one Ridgway hoist it your works to try will be better than anything we can say. The best shops all over the land get them.

"The Ridgway Crane is a Corker."



CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandauerstr., Berlin, Germany.

William Sellers & Co. Incorp.

PHILADELPHIA, PA.

Foundry Machinery.

Every Foundryman knows to his cost that machinery exposed to the dust, dirt and heat of a foundry, is subjected to very severe conditions of service, and unless it is properly designed "to stand the racket" will rapidly wear out.

Having operated Foundries in connection with our Machine Tool Works for half a century, we have had abundant opportunity to study this question in all its phases, both from the theoretical standpoint of the designer of such machinery, and from the practical standpoint of the user.

All of the labor saving appliances intended for use in Foundries, which we advertise in "THE FOUNDRY," and elsewhere, were designed primarily for our own use, and their good qualities were thoroughly tested by us in our own Foundries before offering them to the public.

We make **Foundry Jib Cranes** of iron frame work instead of wood, and without struts, thus being entirely clear of obstructions underneath. They are operated by electricity, steam, or other power, and have rapid motion in hoisting the load and in swinging.

We make **Traveling Cranes** which will lift the copes of the longest molds **absolutely vertically** and without jarring the sand. We make Cranes that lift the largest castings and transport them to any portion of the floor very expeditiously. The most perfect safety devices have been invented and applied to these Cranes, so that the load can never lower except at the will of the operator. All parts of the machinery are conveniently located for oiling, and for making necessary renewals or repairs.

Last, but not least, we make a **Centrifugal Sand Mixing Machine** which has literally worked a revolution in the method of preparing facing sand, molding sand and core sand in foundries wherever it has been introduced. "THE FOUNDRY" for April contains a list of a few of the recent purchasers of this remarkable labor saver in mixing sand, as well as improver of molding sand.

To those who are sufficiently interested in what we have here said to wish to know more, we will be pleased to send on application, illustrated booklets describing our jib and traveling Cranes and Centrifugal Sand Mixing Machine.

Over 15,000 in Use.

ALWAYS READY!

800 TO 2,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y, & Treas.

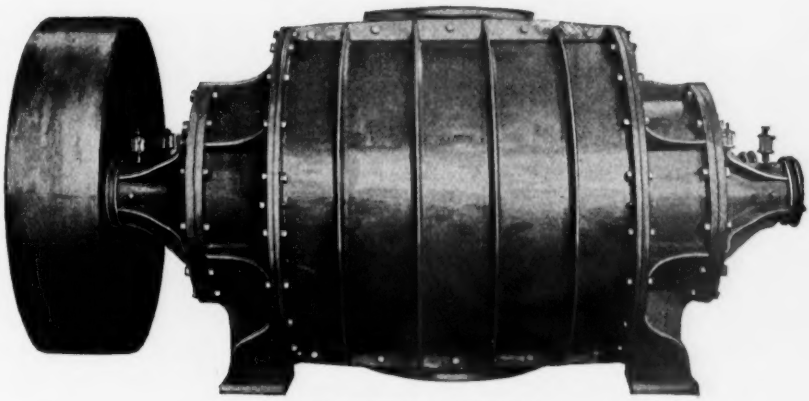
REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

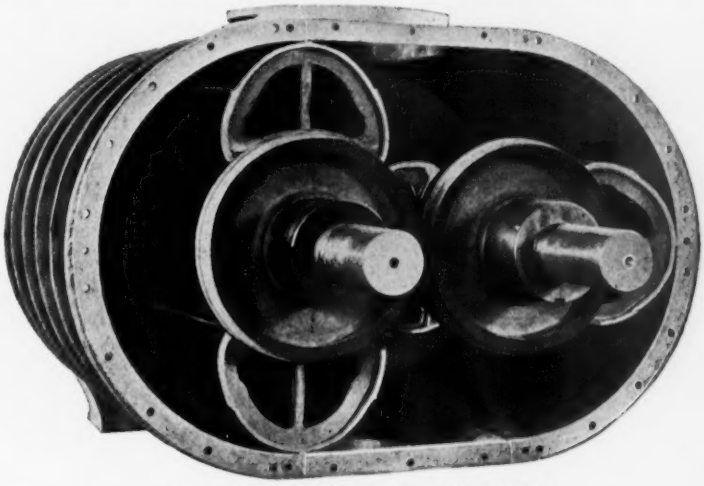
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

Smooth-On Cements

In up-to-date foundry practice, the time has come when the intelligent use of an iron cement that will withstand fire, water and steam and stay where it is put, has become a shop necessity. A blemish on an iron casting may not injure it, but like a wart on a nose it looks ugly and should be removed. Just here is where Smooth-On Castings is valuable to the manufacturer in saving good castings and to the consumer in avoiding delays in procuring them. Don't use an inferior filling because it is cheap, to do so is neither wise nor economical. Use only the best. Then with an expert, whose good judgment in the use and skill in the application, Smooth-On Castings saves time and money. Smooth-On Castings is useful for many other purposes, daily new uses are being discovered for it.

We make a Smooth-On Compound for Engineers and Steamfitters use, for making connections to withstand high temperatures and high pressures. Unequaled for making Flanged Joints and Boiler Patching.

We also make a special cement for connecting coils, for ammonia machines, for refrigeration. Write for Catalogues and Prices.

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

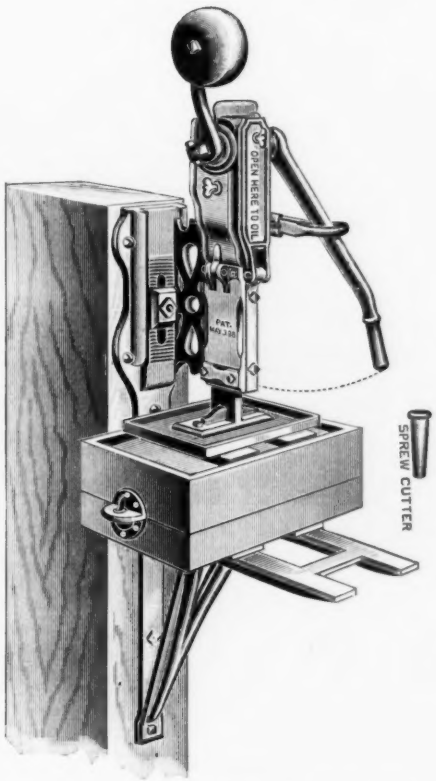
547-549 COMMUNIPAW AVENUE. JERSEY CITY, N. J., U. S. A.

JOHN G. O'NEIL, MANAGER CHICAGO OFFICE, 335 THE ROOKERY.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

J. W. JACKMAN & CO.,
Sole European Representatives, London, S. W. Eng.

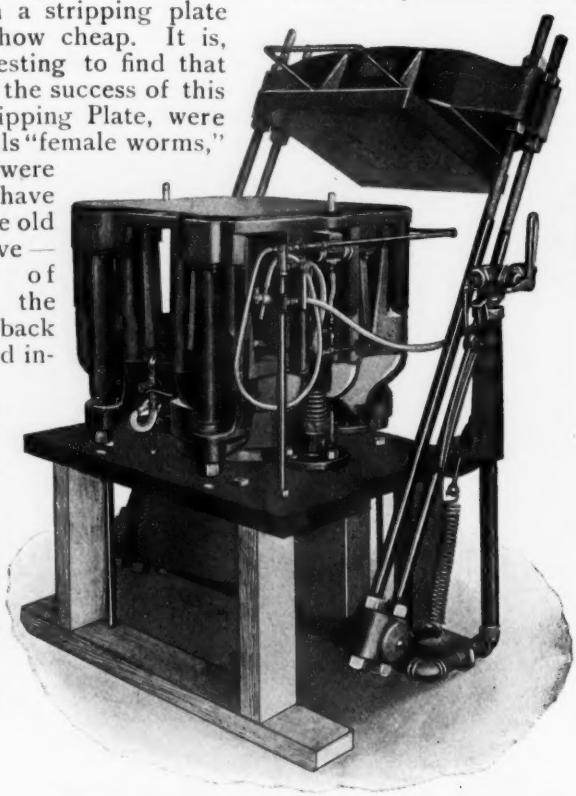
A Bit of Molding Machine History.

The first U. S. Patent for any kind of a Molding Machine was issued early in 1852 to a man named Satterlee, and it was quite a machine—seems to have been in appearance about half way between an eight day clock and a cider press—had "wheels"—of odd kinds, gear, sheave and sprocket, had pitman, levers, pawls, counterweights, chains and toggles—more gear than Kipling put into McAndrews Hymn.

All this mechanical uneasiness was to accomplish what the inventor called "the said work of sifting, filling and pressing."

Thus he omitted from the functions of a machine like a perfecting press and costing almost as much, the drawing of the patterns, the ONLY thing that some foundrymen are today buying $50 machines to do, on each of which they spend upwards of $1,000 for stripping plates and patterns. Satterlee was evidently ahead of his age in the U. S., for in England the very first idea of a molding machine, patented by one Maullin in 1800, was in effect nothing but a Stripping Plate—like some of our machines today—the $50 for machine, $1,000 for patterns kind. Maullin's machine molded screws (gimlet pointed too!), but even he in 1800 would probably have known better than to try to mold a lock case or a flat bevel gear with a stripping plate rig, no matter how cheap. It is, moreover, interesting to find that contributing to the success of this George 3rd Stripping Plate, were what Maullin calls "female worms," which, if they were not nuts, must have been limbs of the old temper of Eve—which would of course carry the Stripping Plate back before Noah, and indicate that some of its family came through in the Ark.

The Stripping Plate still has its uses—in bad company—and we still use it when it is insisted upon, but only four times since 1895.



This is a Vibrator Molding Machine for Flasks 26x26.

Has 12" Draft and Power Ramming.

The Tabor Mfg. Co.

ELIZABETH, N. J.

Schuchardt & Schutte, Berlin, Germany. *James Hartley & Co., of Manchester, Ltd., Manchester, Eng.*

OUR COMMERCIAL TOURIST

COMES TO YOU WITH

A Strictly Business Proposition to Improve Your Castings and Save You Money Compared with other Sand.

Sand Superior for Stove Plate, Malleable Hardware, Agricultural Work Brass, Light, Gray, Iron Medium or Heavy Machine Castings, Etc.

MASTER VAN DYE

STANDARD MOLDING SAND

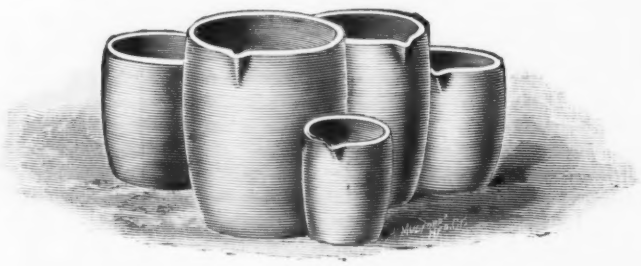
On account of wear and other merits of our sand, "we **guarantee** to save you money and improve the surface of your castings," by the use of same. Quality, quantity and shipping capacity being unequaled we await your orders. :: :: :: :: :: ::

The Newport Sand Bank Co. NEWPORT, KY.

BRIDGEPORT CRUCIBLE CO.

—MANUFACTURERS OF—

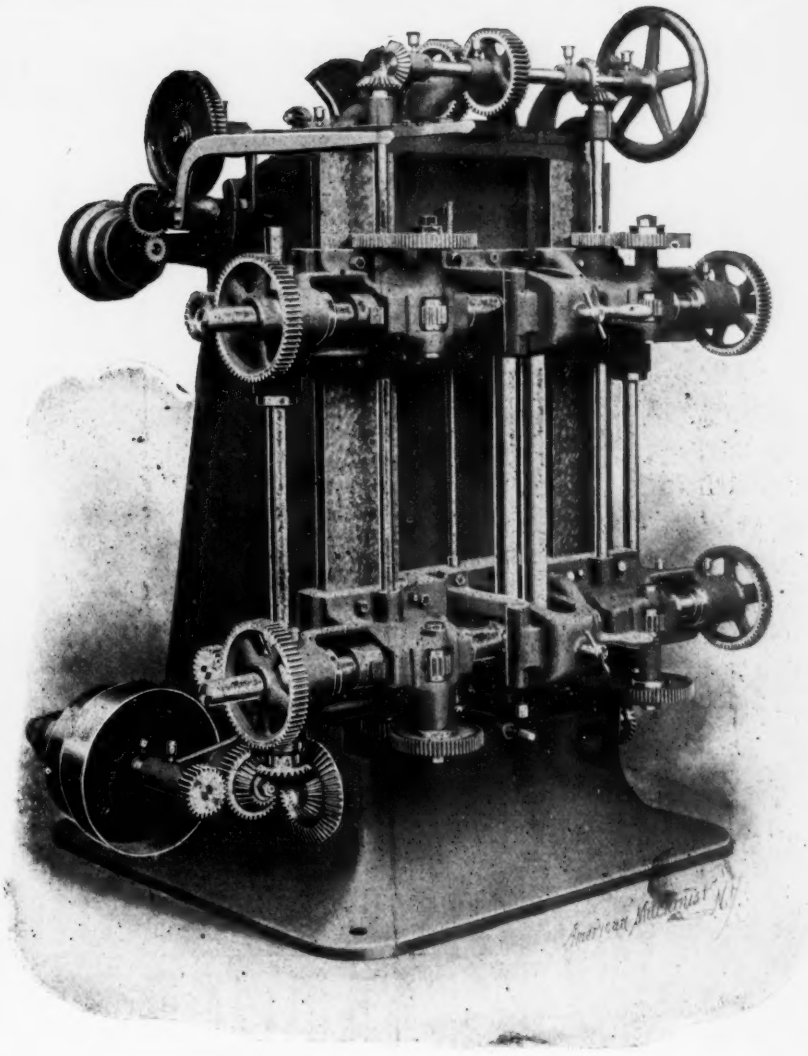
Black Lead Crucibles



Climax Furnace Clay

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U. S. A.



We are Specialists

in our line, the building of drilling machinery. We have been at it for 25 years and our latest production is a four spindle radiator drill that will bore and face 600 loops per day. Entirely automatic. Operator has only to put in and take out the work. Send for our new catalog which also describes a four and a six spindle heater section drill.

The Bickford Drill & Tool Company,

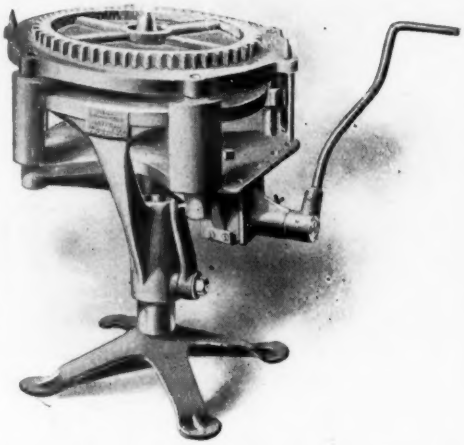
Cincinnati, Ohio, U. S. A.

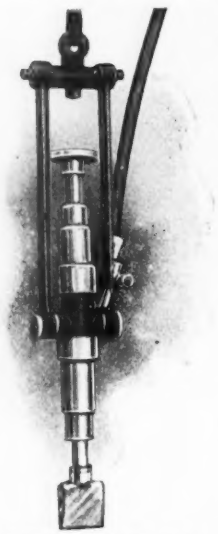
Foreign Agents:--Schuchardt & Schutte, Berlin, Vienna, Cologne, Brussels, Stockholm, St. Petersburg. Charles Churchill & Co., Ltd., London, Birmingham, Manchester, Glasgow. Adphe Janssens, Paris and Brussels. F. W. Horne, Yokohama, Japan.

447

The Quality and Quantity

Of castings are both increased by the use of the molding machines **WE** build. Where castings are wanted true to pattern, the old style hand molding, or rather hand drawing, can not compete with the work turned out on our machines. :: A sketch of the castings you make in large quantities or a sample of same sent to our office will put us into communication, when we will give you an estimate as to what we can do for you.





PATENT APPLIED FOR.

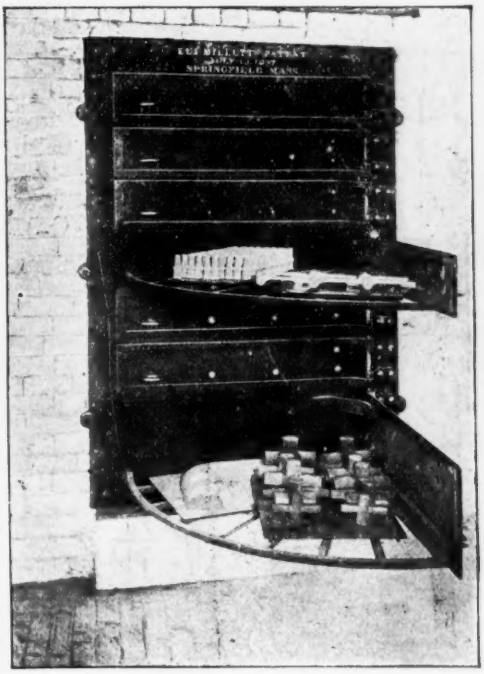
THE MAYWOOD RAMMER

Is the only practical machine for pounding sand on the market. It will do pening as well as butting off.

GET CIRCULAR DESCRIBING IT

Maywood Foundry and Machine Co.

MAYWOOD, ILL.



The Millett Core Oven

Has been on the market for many years. Hundreds of foundries in all parts of the world say it is the best piece of furniture they have about the shop. It ought to do you some good too. Will you write for Booklet? • • •

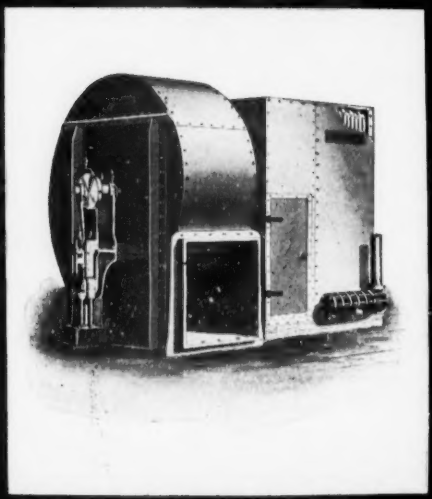
Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

STURTEVANT SYSTEM OF HEATING & VENTILATION



19

Centralized plant.
No scattered steam piping.
Utilizes exhaust steam.
Send for Catalogue No. 84

B. F. STURTEVANT Co. BOSTON,
NEW YORK · PHILADELPHIA · CHICAGO · LONDON ·

DOES IT PAY YOU TO DO WITHOUT IT ? ? ?

The **Coburn Trolley Track** is saving other foundries money. In many cases half the laboring force, ordinarily found about a shop, has been done away with. Such a saving of muscular power ought to interest you. Elbow energy is the most expensive power on earth. You should use as little thereof as possible.

If you will just take a few minutes time—to-day—to write us how your shop is laid out, the kind of work you do, and the amount of iron you handle daily, we shall be glad to make an estimate as to what it will cost you to get ahead of the majority of your competitors. :: :: ::

COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.
U. S. A.

The Time to Get

Your molding sand is now. ::
THE KIND OF SAND
you ought to get is :: :: ::

Ayers' Zanesville

It is just right for all kinds of work. Besides, the price is one that will suit you. Let us know where you live and we will quote on your season's supply.

E. M. AYERS,

ZANESVILLE, OHIO.

WESTERN REPRESENTATIVE:
H. S. VROOMAN, :: :: 220 West 20th Street, CHICAGO, ILL.

Nonland Building.

PITTSBURG, PA.

Cherry Valley Quality

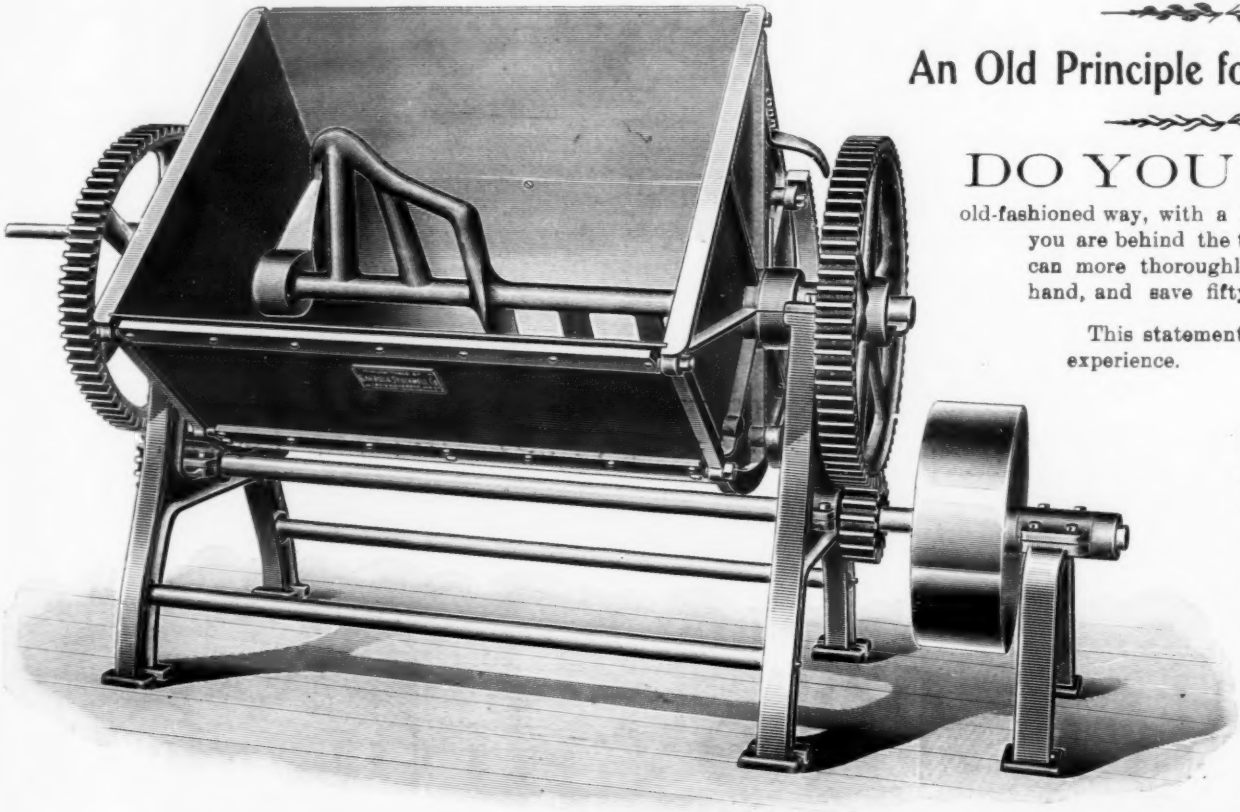
Is found in but one brand of pig iron—the genuine ***Cherry Valley*** made by the ***Cherry Valley Furnace.*** :: :: ::

When your customers begin to kick, when they kind of hint that you do not seem to understand your business, then let your thoughts wander away from that cheap pig iron you are using. ***The cause is there.*** The way to remove the effect is to use ***Cherry Valley*** in your mixture. It is both strong and soft. Send us that order to-day. Prompt shipment of small as well as large requirements.

Cherry Valley Iron Co.

Murtland Building. PITTSBURG, PA.

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

DO YOU mix your facing sand, core sand, fire clay, etc., in the old-fashioned way, with a laborer and a shovel? Then you are behind the times. With this mixer, you can more thoroughly mix it than is possible by hand, and save fifty per cent. of your labor.

This statement can be verified by actual experience.

The material is shovelled into the machine or fed in through a hopper, after riddling. The machine is then started, and in five minutes the mass is perfectly mixed. Turning a crank at the side cants the machine and empties the material either on the floor or into a receptacle provided.

Capacity, 250 lbs. every five minutes.

Pulley, 24 in. diam. x 6 in. face.

Floor Space, 7 ft. x 3 ft.

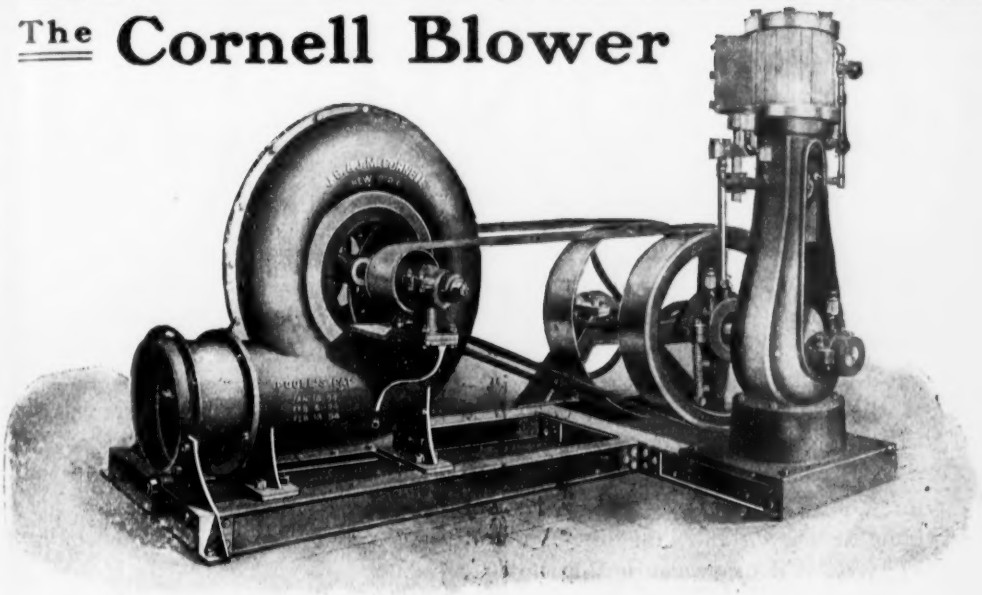
Speed of Pulley Shaft, 125 revolutions.

Weight, 1250 lbs.

For further particulars, write

BARBOUR-STOCKWELL CO., 205 BROADWAY, CAMBRIDGEPORT, Mass.

The Cornell Blower



THEY DO THE WORK

NEW AMSTERDAM GAS COMPANY.

340 Third Ave., NEW YORK CITY, July 10th, 1900.

Messrs. J. B. & J. M. Cornell, 26th St. and 11th Ave., New York City.

Dear Sirs:—I take pleasure in stating that the two large steel blowers which you furnished for our Ravenswood Works have given us great satisfaction. They do the work for which they were designed with comparatively little noise and run smoothly. They are well made and I am satisfied will be durable. We hesitated some time before giving this order, believing that your experience was not sufficient to give us what we desired, as our specifications were rigid and the requirements severe, but I have no reason to regret having placed the contract with you and I hope to be able to do business with you in the future. Yours very truly,

ALTON S. MILLER, Chief Engineer.

THEY RUN SMOOTH

G. C. KRUEGER DRYING COMPANY.

134-148 LAFAYETTE STREET, NEWARK, N. J., July 24, 1900.

Messrs. J. B. & J. M. Cornell, New York City.

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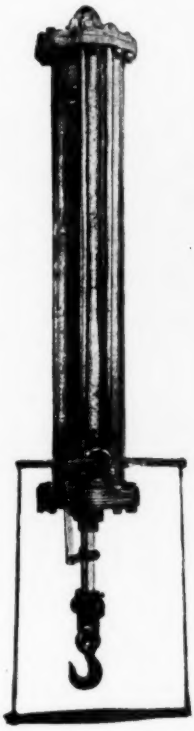

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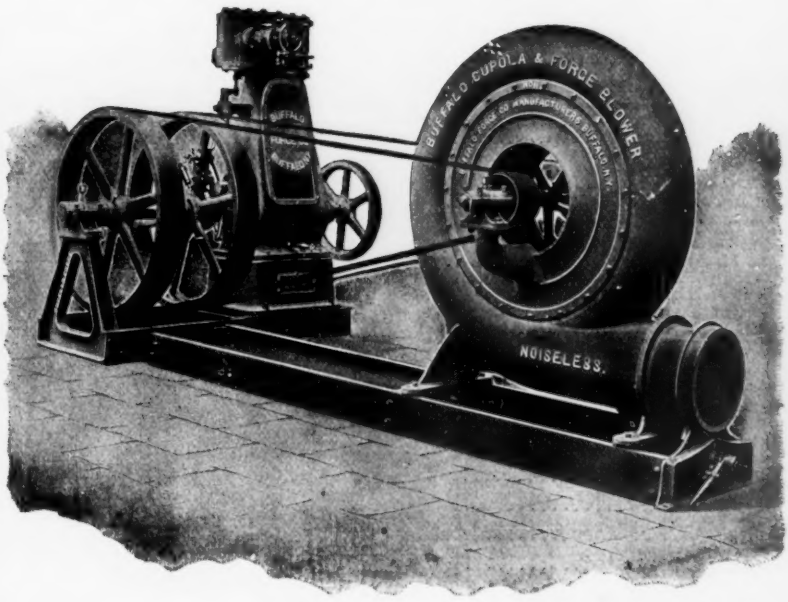

Buffalo Forge Company,

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Alphabetical Index to Advertisers.

Adams Co., The 38
Addy & Co., Matthew 38
American Bridge Co. 8
American Glutrose Works 48
Ajax Metal Co. 36
Ayers, E. M. 22

Barbour-Stockwell Co. 21
Barnard & Leas Mfg. Co. 42
Barnett Foundry Co. 43
Bickford Drill & Tool Co. 17
Brass Founders' Supply Co. 48
Bridgeport Crucible Co. ..... Colored Insert
Buffalo Forge Co. 29

Carborundum Co. 44
Case Manufacturing Co. 43
Cherry Valley Iron Co. 23
Chicago Pneumatic Tool Co. 7
Chisholm & Moore Mfg. Co. 42
Church, S. R. ..... 34, 37 and 38
Clayton Air Compressor Co. 33
Cleveland Facing Mill Co. 6
Clinton Iron & Steel Co. 31
Coburn Trolley Track Co. 21
Connersville Blower Co. ..... Back Cover
Cornell, J. B. & J. M. ..... 25 and 43
Cowles Electric Smelting and Aluminum Co. ..... Inside Back Cover

Dayton Coal & Iron Co. 38
Decamp Bros. & Yule 38
Diamond Machine Co. 33
Dixon Crucible Co., Joseph 5
Domhoff & Joyce Co. 38

Fanner Mfg. Co. 45
Fox Machine Co. 42

Garden City Sand Co. 49
Gobeille Pattern Co. 34
Goff, Horner & Co. 46
Goodrich & Co., F. A. 38
Gould & Eberhardt 31

Hanna & Co., M. A. 38
Heyl & Patterson 36
Hillman & Co., J. H. 38
Holmes & Co., F. B. 34
Hunt & Co., C. W. 40

Jacobson, A. M. 37

Keep, W. J. 41

Mack, Thomas 38
Maurer & Son, Henry 34
Maywood Foundry & Machine Co. 18
McCormick Co., J. S. 40
McCullough-Dalzell Co. 27
Millett Core Oven Co. 19
Minerva Pig Iron Co. 39
Mohr, J. J. 39

Newport Sand Bank Co. ..... Colored Insert
Northern Engineering Works ..... 31 and 44

Obermayer Co., The S., Front Cover and Page 1

Paxson Co., J. W. ..... 2 and 3
Philadelphia Pneumatic Tool Co. 45
Pickands, Brown & Co. 38
Peirson & Co., C. L. 33
Pilling & Crane 39
Presbrey Fire Brick Co. 35
Pridmore, Henry E. 40

Ridgway & Son Co., Craig 10
Rogers, Brown & Co. ..... 39 and 50
Roots Co., P. H. & F. M. ..... Colored Insert

Scioto Star Fire Brick Works 35
Sellers & Co., Wm. 11
Smith & Co., A. F. 35
Smith Foundry Supply Co., J. D. 23
Smooth-On Manufacturing Co. 14
Staten Island Clay Co. 35
Swarts Metal Co. 46
Stevenson, Field & Co. 39
Stover Manufacturing Co. 39
Stow Manufacturing Co. 37
Sturtevant Co., B. F. 31
Syracuse Malleable Iron Co. 15

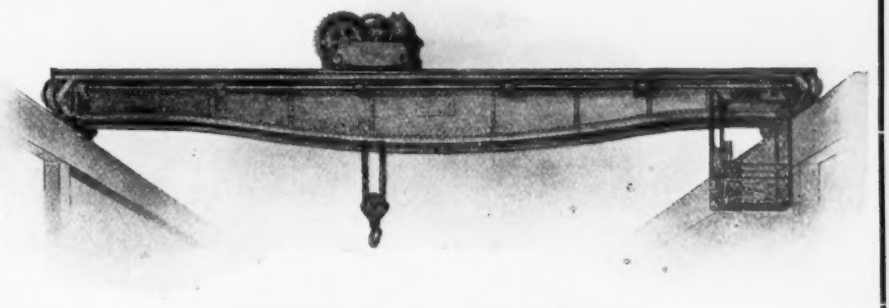
Tabor Manufacturing Co. 16

Vrooman, H. S. 37

Washington Coal & Coke Co. 9
Wells Light Manufacturing Co. 12
Whitehead Bros. Co. 4
Whiting Foundry Equipment Co. 28
Wilbraham Baker Blower Co. 13

CONTENTS.

Trade Outlook 45
Hot Iron. Edward Kirk 46
Cast Iron Notes. W. J. Keep 48
Kranks' Korner. Illustrated 49
Casting a Corliss Cylinder. Illustrated. R. H. Palmer 50
Stripping Plates. Illust. Geo. Buchanan. 55
Tricks of the Trade 56
How to Become a Foreman. Aaron Frankenheim 56
Stripping Plates. A. E. Fay 58
One Feature of Boom Times 58
Southern Iron 59
Pit for Heavy Work. Illust. Thos. L. Austin 60
Position of Molders. P. Longmuir 61
New Orders Coming 62
Some Features of the Molders' Strike in Cleveland. Illustrated 62
Problem of Machine Molding. E. H. Mumford 64
Foundry Industry in the South 67
Coke Production 68
Pneumatic Hand Rammer. Illustrated 69
Baby Bessemer Process 70
Large Pulley Boss. Illustrated. Geo. Buchanan 72
Cupola Malleables. P. H. Davis 73
Pipe Founding. Illust. E. A. Kebler 73
Open-Hearth Steel Process. Benj. Talbot. 76
Among the Foundries 81
Deaths 83
Fires 83
Stearns Molding Machine. Illustrated 84
Old Western Foundry 85
New Inventions 85
Coke Trade 85
Two Consolidations 86
A Good Rig. Illust. "Ironmonger" 87



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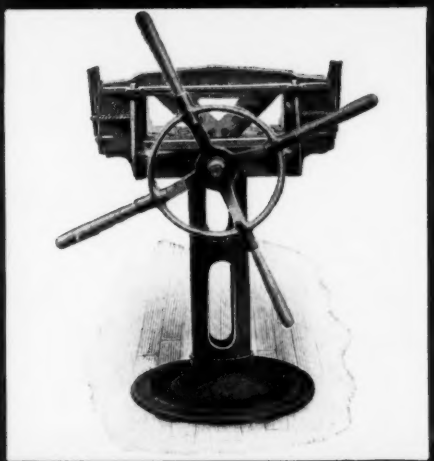

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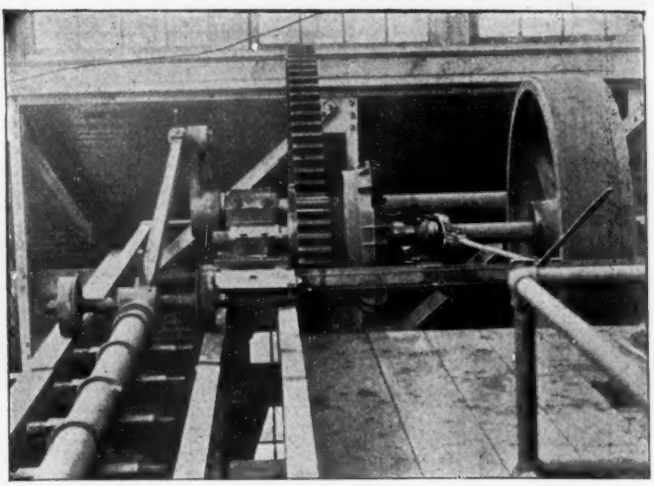

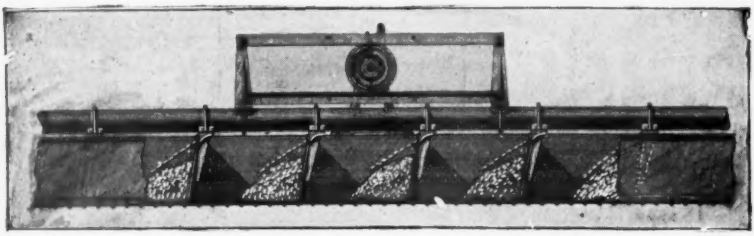

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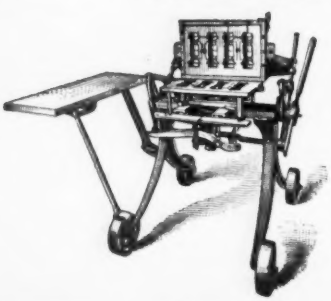

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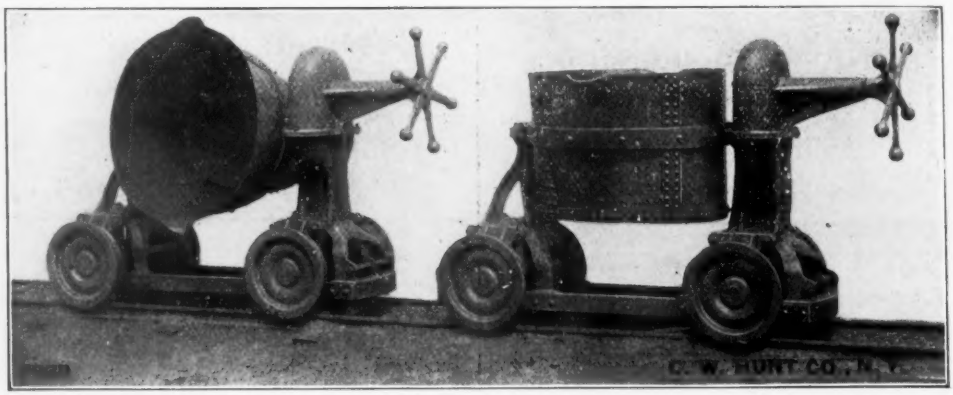

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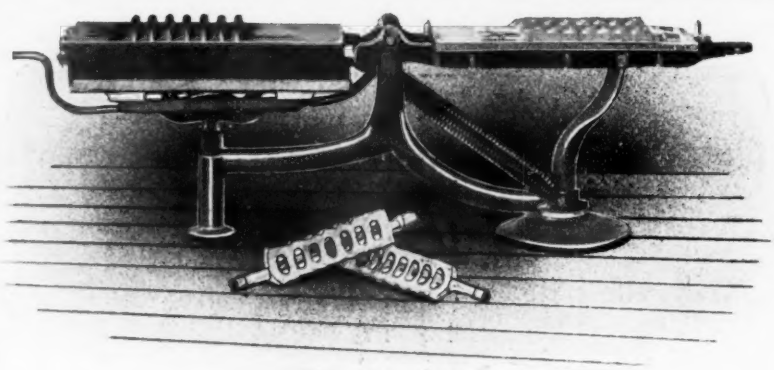

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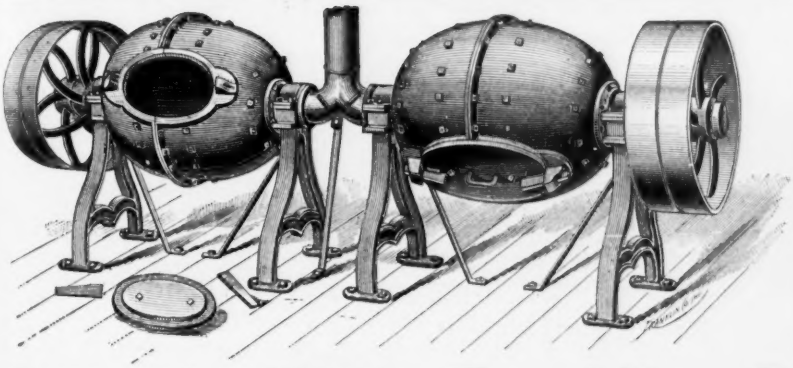
Pridmore Sand Molding Machines

MANUFACTURED BY

HENRY E. PRIDMORE

Nineteenth and Rockwell Sts., CHICAGO, ILLINOIS



A Fine Pair

Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

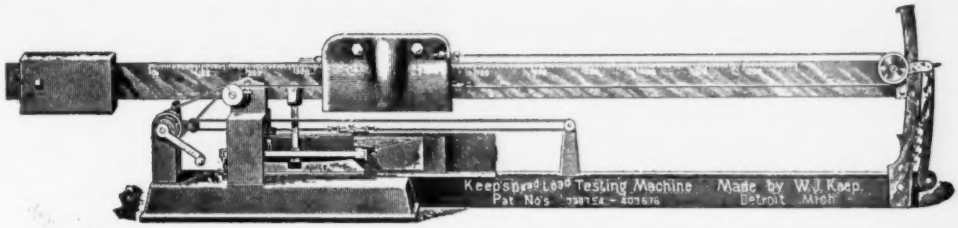
Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET, FREEPORT, ILL

MECHANICAL ANALYSIS

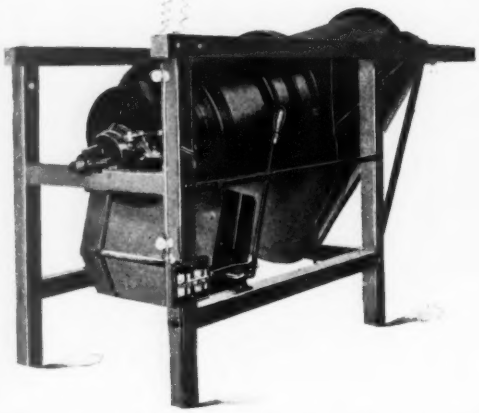


The Only Practical Method for . . . . MAKING CASTINGS OF A DESIRED QUALITY AT A LOW PRICE. ✻

Send for Testimonials and for Description of

W. J. KEEP, Detroit, Mich.

KEEP'S TEST APPARATUS.



Save Your Iron

Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months. ::

MOLINE PLOW CO., Agricultural Implements
Foundry Office, MOLINE, ILL., May 21, 1900

Mr. C. R. Stephens, Supt.:

Replying to your request for report on Magnetic Separator bought of Messrs. Barnard & Leas I have to say: It separates practically every scrap of iron from the cinders, is simple in construction and operation, and the only wearing parts so far as I can see are the oiled bearings on which it revolves. We first crush our cupola cinders in a tumbling mill, extracting iron as usual in this way. The dust that passes out between staves of mill is then passed through the Magnetic Separator. Before getting the latter into operation we had accumulated a large pile of dust which was apparently free from iron. From this, one laborer has gotten from 2000 lbs. to 2300 lbs. of iron per day of ten hours. I have seen many devices for extracting iron from cupola cinders, but never anything to approach this in thoroughness of work and economy in operation. Respectfully, E. H. PUTNAM, Foreman.

Give this machine a trial. The saving will surprise you. Write for prices and discounts.

Barnard & Leas Mfg. Co.

Mill Builders and Mill Furnishers **MOLINE, ILL.**

FOX THE ORIGINAL WOOD TRIMMERS

No. 4 A Cut 4 in. high, Cut 8 in. long.

8 000 this size alone in use.

This size should be on

Every Pattern Makers Bench.

We make larger ones for heavier work.

The Time Saved by FOX TRIMMERS

pays for them in a very few months

Ten Sizes
12,000 Sold

ANY SIZE ON TRIAL

New complete Catalogue just out. Write for one.

Drills, Shapers, Milling Machines

No. 6 E

Cuts 6 in. high. Also a very popular size.

FOX MACHINE CO., 850 N. Front St., Grand Rapids, Mich.

CRANES

HAND POWER AND PNEUMATIC.

CHAIN HOISTS

THE

CHISHOLM & MOORE MFG. CO.

CLEVELAND, O.

MALLEABLE IRON CASTINGS,

THE CHISHOLM & MOORE MFG. CO.,

CLEVELAND, OHIO.

WE ARE FOUNDERS, THE KEY TO PROMPT DELIVERIES.

Interchangeable Steel Pins

Perfectly Fitted All Faces Level

Our Testimonial. The Oscar Barnett original **<STANDARD> BEVEL FLASK,** our product the last fifty years, requires no ribs, sales increasing yearly. Why use inferior grades? We guarantee ours! Complete Equipment Catalogue for the asking.

THE PLEASURE OF SUBMITTING PRICES IS SOLICITED

N. B.—Always state exact depth of Pin Part and other Half Flask, also width and length inside at parting.

MANUFACTURERS OF HARDWARE AND TOOLS.

Oscar Barnett Foundry Co.,

L. D. PHONE 1045. Bruen, McWhorter and Hamilton Sts., Newark, N. J., U. S. A. ESTB. "45"

STEAM CRANES ELECTRIC

BELT & HAND POWER HOISTING APPLIANCES.

CLEVELAND MANF'G. CO. COLUMBUS, O.

CC

CORNELL'S CORE COMPOUND

Cornell's Core Compound

Milligan's Pat., July 17, 1900.

Makes cores that are perfect at a less cost than anything else on the market. Try it? No charge for sample delivered F. O. B., New York. :: :: ::

J. B. & J. M. CORNELL
NEW YORK CITY.

Carborundum has Three Essential Points of Excellence:

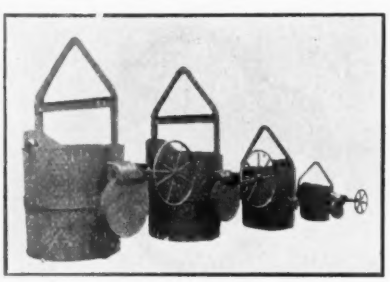
Hardness, Sharpness, Brittleness.
It is the hardness that makes it long lasting; the sharpness that makes it the fastest cutting abrasive in the world; the brittleness that keeps the cutting edge always clean and fresh.

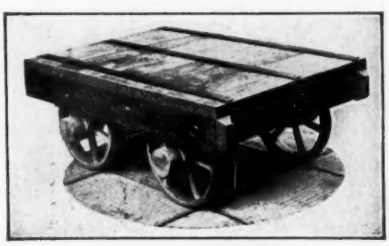
CARBORUNDUM

is used for abrasive work of all kinds. It is made in the form of wheels, moulded shapes, paper and cloth and powder. It is guaranteed to save money to its users.

We have an illustrated booklet that tells the story in detail.

The Carborundum Company,
Niagara Falls, N. Y.





FOUNDRY MACHINERY AND EQUIPMENT

These cuts give just a hint of the line we make. Are you building a foundry? Do you want complete equipment sold direct to you and made to your order? Write us.

NORTHERN ENGINEERING WORKS,
4 CHENE STREET,
DETROIT, MICH., U. S. A

THIS MAN

With our **HAND** or **FLOOR RAMMER** will do the work of from 4 to 6 men on any kind of floor or heavy loam work. :: Weighs 45 lbs. Strikes 250 blows per minute. Especially adapted to ramming converter bottoms.

CATALOGUE

PHILADELPHIA PNEUMATIC TOOL CO.

PHILADELPHIA, 21 So. 12th St.
NEW YORK, 149 Broadway.
BOSTON, Exchange Building.
PITTSBURGH, Wood and Water Sts.

Fanner Chaplets

GIVE but little cause for dispute in the foundry. :: When the molder closes his cope he is sure that there is going to be no sputtering or blowing to spoil his casting. :: Besides, the . . . . . .

Fanner Chaplets

do not leave those ugly marks your home-made chaplets are now doing.

... THE ...

Fanner Mfg. Co.,

Brookside Park,

CLEVELAND, OHIO.

Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

Swarts Metal Refining Co.

SMELTERS AND REFINERS

WE are supplying brass foundries throughout the country with our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We also carry a stock of the best makes of Crucibles at the lowest prices.

Try a small barrel of our Iron Flux at seven (7) cts. per lb. for the purifying and removing of Iron in the making of Brass Castings.

We also supply brass foundries with Scrap Metals of all kinds, at the lowest market prices, put up in crucible shape, if so desired.

Main Office and Works, 18-20 N. Desplaines St.,

ESTABLISHED 1885
INCORPORATED 1895

CHICAGO, ILL.

CORRESPONDENCE SOLICITED.

COKE

"ALEXANDRIA," High Grade, Low Sulphur, FURNACE and FOUNDRY COKE.

Made exclusively from washed coal. Special care taken in grading and selecting for **FOUNDRY** use.

HIGHEST QUALITY. LOWEST PRICES.

SATISFACTION GUARANTEED.

WRITE

Goff, Horner & Co.

PIG IRON, STEEL, COAL and COKE

308-309-310 Lewis Building, PITTSBURG, PA.

Do not be a Factotum

The day for the man who does odd jobs, the Jack-of-all-trades, has gone by forever. There is no longer room for the smatterer, who can do a little of everything and not much of anything. Everybody wants the trained, educated worker, who can do one thing better than anybody else. The factotum is nearly always a failure. To be great one must concentrate. As competition becomes more intense, the demand for specialists, for experience, increases. Everywhere in the business and professional world there is a standing advertisement for the man who can do one thing efficiently, not many things indifferently.

This age of concentration calls, not for educated men merely, not for talented men, not for geniuses, not for Jack-of-all-trades, but for men who are trained to do one thing as well as it can be done. Napoleon could go through the drill of his soldiers better than any one of his men.—*Success.*

By reading the following books you will increase your earning power. You will be able to do better work yourself. You will know whether others are up to the standard:

American Foundry Practice,	$2.50
Molders' Text Book,	2.50
The Iron Founder,	2.50
The Iron Founder Supplement	2.50
Encyclopedia of Founding,	3.00
Metallurgy of Cast Iron,	3.00
The Cupola Furnace,	3.50

Let us have your order **to-day.**

The Foundry Publishing Co.,

DETROIT, MICH., U. S. A.

We Make **FLASKS** A Specialty

AND

Make Specialties of all kinds.

NEWEST BEST

You should send for our 1900

it describes goods you need every day.

THE BRASS FOUNDERS SUPPLY CO.,

NEWARK, N. J., U S. A.

A Good Opportunity

for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

The business has been established since 1868 and is in a paying condition.

A full chance is offered intending purchasers to investigate. Address,

FOUNDRY AND MACHINE SHOP,
Box 309, care The Foundry,
DETROIT.

FOUNDRIES

that use

F·L·O·U·R

for their

C·O·R·E·S

and have no

B·L·O·W·S

don't make any

CASTINGS

Write for one of our little booklets and see what we say about . . . . .

BLOWS

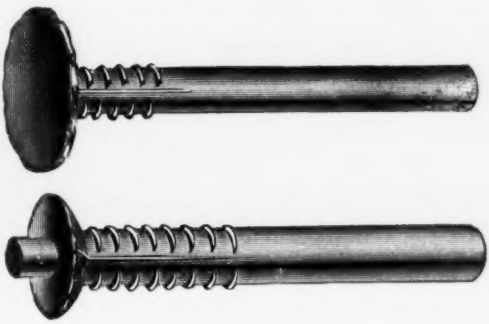
when using our Glutrose Core Compound

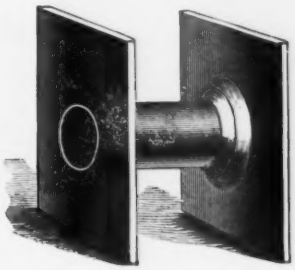
American Glutrose Works

12 and 14 George St., Camden, N. J.

CHAPLETS

ALL KINDS AND SIZES.



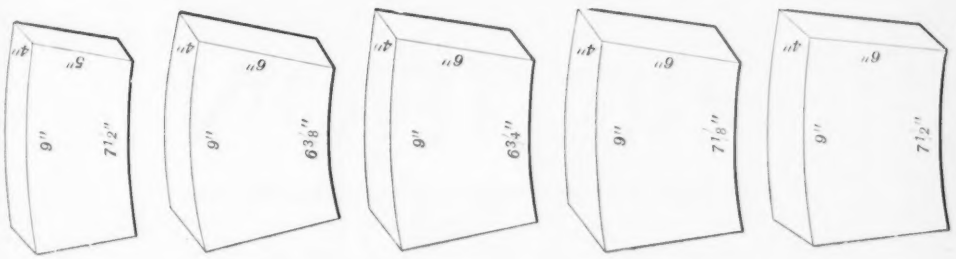


J. S. McCormick Co.,

Foundry Supply House PITTSBURG, PA.

A GOOD TIME

TO MAKE A TEST OF CUPOLA BLOCKS WOULD BE THE PRESENT



Why not learn whether you are wasting or saving money in the use of the brand you are now using. Let us furnish you a trial lot of **Dome Blocks.** We know we can save you money in first cost and furnish a Special Block, the very best obtainable. ***We are not guessing, we know it.*** **Our Molding Sand, Fire Clay, Loam, etc.,** are all first class. Can't we send you samples. :: :: :: ::

The **Garden City Sand Co.** 3 TELS. ALL M 4827. 188 Madison Street, CHICAGO.

FOUNDRY COKE

We handle the best brands produced in all sections of the United States, and are prepared to fill satisfactorily car load orders or yearly contracts. **It doesn't matter where you live** we can supply you from the most advantageous producing point. Send in your inquiries for Coke, and **don't forget us when you want**

PIG IRON

Rogers, Brown & Co.

CINCINNATI
BUFFALO
CLEVELAND

NEW YORK
PHILADELPHIA
BOSTON
BIRMINGHAM

CHICAGO
PITTSBURG
ST. LOUIS

TO THE FOUNDRYMEN OF THE UNITED KINGDOM

We beg to advise that we now carry a large and complete stock of our celebrated

East India Plumbago

Founders Peerless Perfect Wash

India Silver Lead

and other Facings and Blackings in LONDON and GLASGOW, ready for delivery in any quantity from a barrel to a car load.

SAMPLES AND PRICES ON APPLICATION

Our manufactures have been the standard for thirty years the world over, and we guarantee them to give perfect satisfaction. Our special catalog of modern and improved foundry requisites of every description will give you all the information.

CORRESPONDENCE SOLICITED.

THE S. OBERMAYER CO.

CHICAGO, ILL. CINCINNATI, O.

No. 60 St. Enoch's Square, GLASGOW.

No. 39 Victoria Street, LONDON, S. W.

OUR MOTTO:

"Everything You Need in Your Foundry"

Is so identified with the name of :: :: :: :: ::

The S. Obermayer Co.

that it means one and the same thing to a great many foundrymen in every section of the country, **because** we are the only Foundry Facing, Supply and Equipment house that carry everything in stock ready for shipment. :: :: :: :: :: ::

Besides being the largest manufacturers of Foundry Facings and the largest importers and refiners of East India Plumbago, Graphite and Silver Lead, **we are the representatives and sales agents** of most all the prominent manufacturers of modern foundry appliances in the United States. :: ::

A few among the many we represent and of whose goods we have always a complete stock are the following: ----------

Whiting Foundry Equipment Co.,	Cupolas, Ladles, Furnaces, Etc.
Millett Core Oven Co., . . .	Core Ovens
Henry Pridmore, . .	Pridmore Molding Machines
Ezra Sawyer, . . .	Magnetic Metal Separators

Peerless Rosin Grinders
Orbison's Garnet Woodworking Machine
Alex Thompson's New Malleable Flask Clamps

And many other useful and money saving Foundry Equipments.

Send for General Catalogue No. 30 for full information.

The S. Obermayer Co.

CHICAGO, ILL. CINCINNATI, O.

SAVE MONEY

By using Good Facings and Blackings on the Mold. You don't have to spend a lot of money for cleaning Castings afterwards. This is a Fact.

To enable foundrymen at a glance to select the brands of facings or blackings best adapted to the size, nature and quality of castings they may have use for, we classify them as follows:

For Cast Iron, Gas and Water Pipe—Best Coke, Lehigh, Reliance and Charcoal.

For Lighest Machine Brass Castings and Holloware — Talc, Soapstone and Charcoal—Cranston.

For Cores—Charcoal, Coke, Blackstone, Anthracite, Plumbago and Black Lead—Cranston-Peerless Perfect Wash.

For Agricultural Implements and Medium Weight Castings—Brilliant No. 3, Plumbago, Reliance, Blackstone, Pure Mineral XX Mineral—Cranston.

For Heavy Machinery, Rolling Mill Car Wheels, Ingots, Blast Furnaces, etc.—Founders' Perfect Wash, Brilliant No. 1, "H. B. B.," "F. & C.," Plumbago, Blackstone, North Carolina Lead, Peerless Perfect Wash.

For Car Wheels—XX Mineral Reliance, Blackstone — Cranston and Special Car Wheel Facing.

For Loam and Dry Sand Work—The same blacking as the foregoing, including also our best Coke Blacking and Peerless Perfect Wash.

For Steel Castings and Steel Converters—Brilliant No. 1, and our Special Steel Casting Wash and Special Silica.

For Brass Castings—Charcoal, Carbon, India Silver Lead or Plumbago.

For Stove Plate and Piano Castings, Light and Heavy Facings are used as follows:—First or Heavy; Brilliant No. 2 Plumbago, Blackstone, Providence, XXX Heavy, Garland and North Carolina Lead. Light or Top or Return: National Return, Eagle Return, Phoenix or Carbonized Return and Charcoal and Peerless Return.

For Holloware Castings—Soapstone Talc and sometimes extra fine Sea Coal.

For Cannon or Cylinder Stoves and Kettles—Our celebrated Cannon Stove Facing applied with camel hair brush, and our Peerless Plumbago. Sometimes a mixture of Soapstone and Fine East India Plumbago. Sea Coal is also mixed with the sand.

Sea or Stone (Bituminous) Coal Facings are invariably used in machine foundries in addition to the blackings. The object of their use is to assist in peeling a casting as well as to vent a mold. They are mixed in with the sand.

For molds that do not require it, and, which it is neither desirable nor expedient to "slick," use Blackstone, North Carolina Lead, German Black Lead, Pure Mineral or Plumbago. After dusting the mold with any of these put down the cope. None of them will wash or run before the iron and the castings will "peel" without difficulty.

The S. Obermayer Co.

CINCINNATI, OHIO. CHICAGO, ILL.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

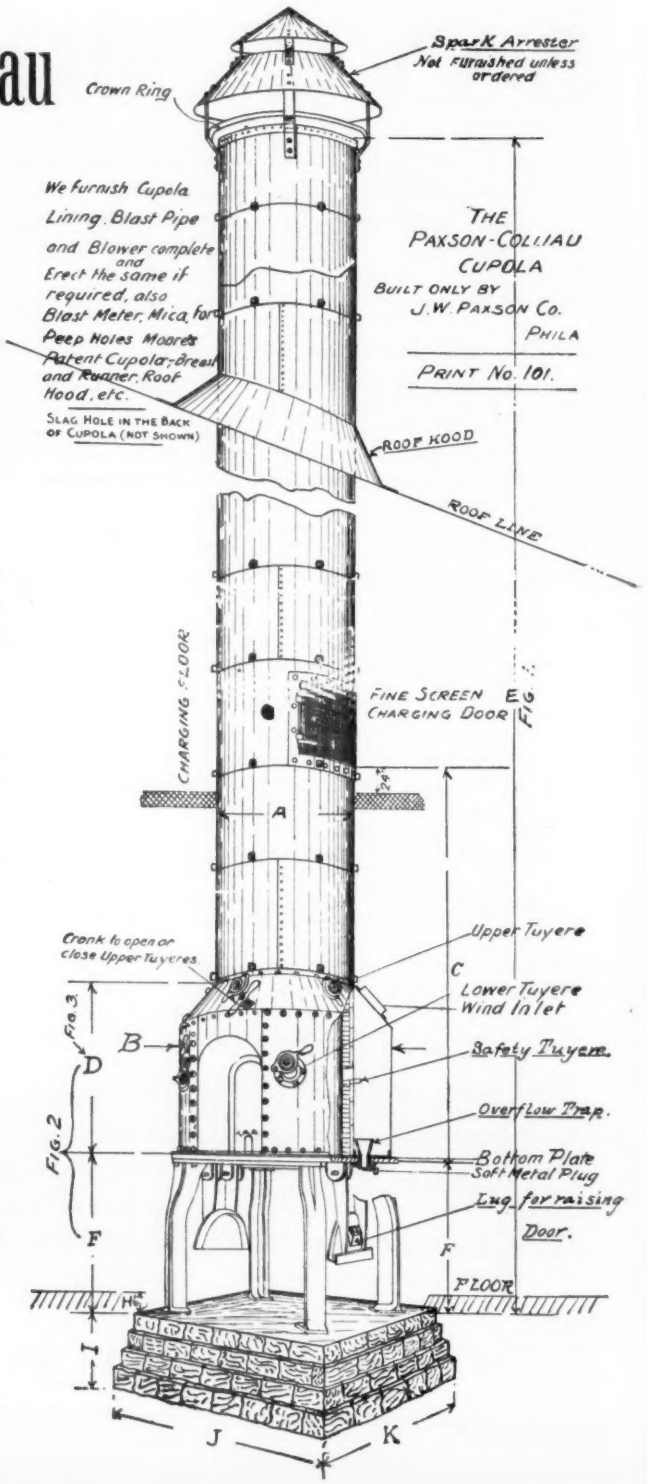
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J.W. Paxson Co.

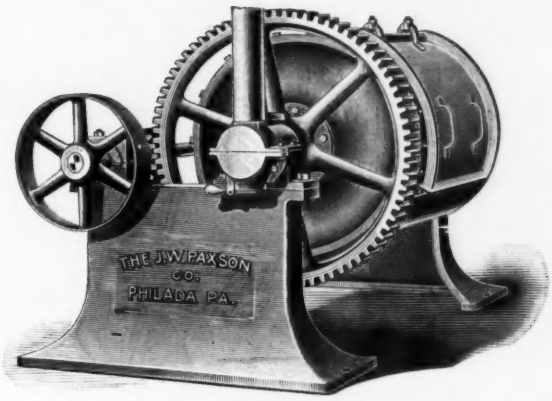
1021 . . .
North Delaware Avenue,

PHILADELPHIA, PA., U S. A.



Paxson Exhaust Rumblers

MADE OF STEEL.



MADE IN SIZES:

18	inch	diameter,	any	length	from	24	inch to	48 inch.
24	"	"	"	"		30	"	48 "
30	"	"	"	"		36	"	54 "
36	"	"	"	"		36	"	54 "
40	"	"	"	"		36	"	60 "

No Cast Iron Staves

BUT

One Solid Sheet of Steel.

Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors.

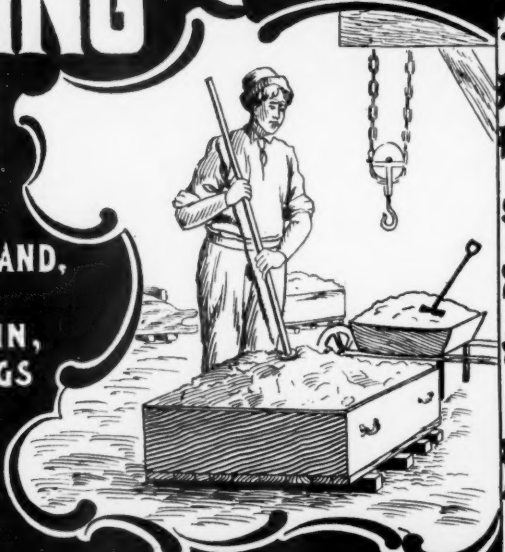
These are the best and most economical Rumblers ever made.

J. W. Paxson Co., 1021 North Delaware Avenue, PHILADELPHIA, PA., U. S. A.

WHITEHEAD BROTHERS COMPANY.

MOLDING SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.



ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
NEW YORK.

PROVIDENCE OFFICE,
42 S. WATER ST.

BUFFALO OFFICE,
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITON RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L.I.
WATERFORD, N.Y.
ALBANY, N.Y.
CEDAR HILL, N.Y.
COXSACKIE, N.Y.
CLINTON POINT, N.Y.
ATHENS, N.Y.
COEYMANS, N.Y.
WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.

It's UP TO YOU

WHETHER you will use poor substitutes instead of the genuine Dixon silver lead facings and blackings. :: A member of the American Foundrymen's Association at the June Convention said:

> "The blackings of the present day are composed to a great extent of common cement, pulverized anthracite, charcoal, soapstone and other cheap minerals, and it is a question if they do not cost more than they are intrinsically worth."

If you figure up how much longer it takes a molder to properly slick up a mold with a poor blacking—even if he can at all—you will probably find as others have that it will pay you to use one of the pure plumbago blackings made by Dixon. Castings are harder to clean with poor blacking. If the sand fuses it is due to poor blackings. Molder's extra time costs money. It costs more to clean castings than difference in price of blacking. Bad blackings make bad work and bad work often loses a customer. :: Every foundryman should strive to have his shop known for turning out the best work. :: If you will write us we think we can help you toward better work at less cost. :: "It's up to you."

Joseph Dixon Crucible Co.

JERSEY CITY, NEW JERSEY

C. F. M. FOUNDERS' PERFECT WASH

A FEW MORE

FOUNDRY SUPPLIES

CORONA PLUMBAGO

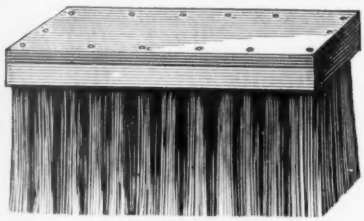


Fig. 17 in Catalogue.

Steel Wire Casting Brushes

ALL SIZES AT RIGHT PRICES.

The Cleveland Facing Mill Co.

FRANK H. CHAMBERLIN, Prop.

MANUFACTURE FOUNDRY { FACINGS SUPPLIES CLEVELAND, O.

Molders' Soft Brushes

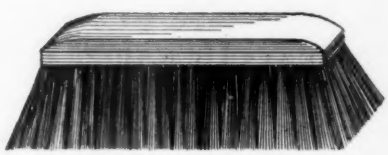


Fig. 28 in Catalogue.

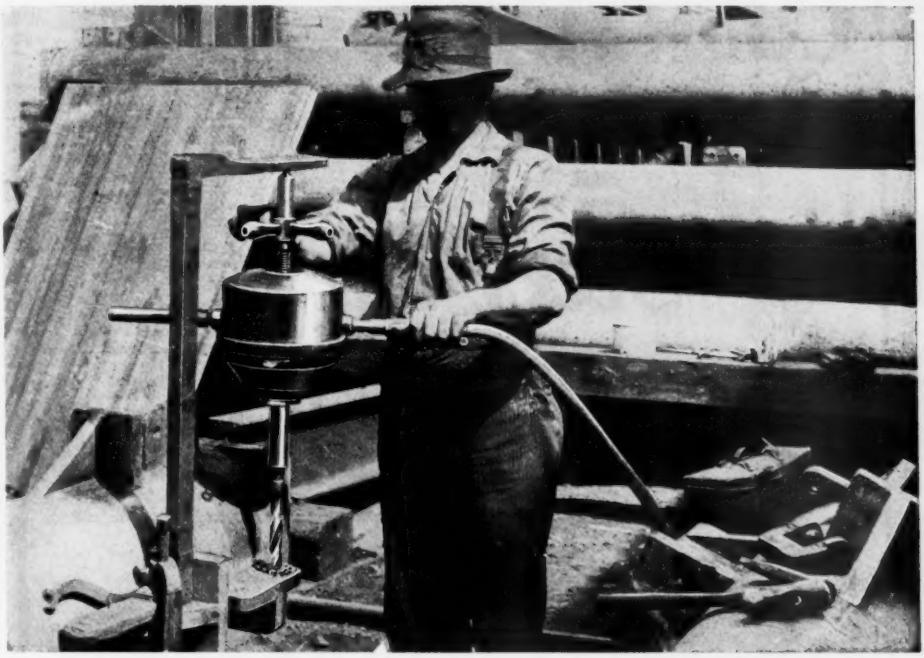
BLOCK 10X2 IN. BRISTLES 3 IN. LONG.

PERFECTION CORE BOXES

SEND FOR CATALOGUE

CUPOLA BLOCKS

CHICAGO PNEUMATIC TOOL CO.



Pneumatic Tools in designs and sizes for **Foundry Work.**
Our Customers say: "They go beyond guarantee."

One man does the work of four with our :: :: :: :: ::

Chipping Hammers

For drilling, reaming and tapping use our :: :: :: ::

AIR DRILLS . . .

They are especially valuable on heavy work not readily put under your drill press, and drill and ream up to 3 inches in diameter in iron and steel. :: :: :: :: :: ::

Air Compressors and Hoists

We send our tools on trial subject to approval. :: ::

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95 LIBERTY ST.,
NEW YORK.

General Offices:
MONADNOCK BLDG.,
CHICAGO.

AMERICAN BRIDGE COMPANY

DESIGNERS AND BUILDERS OF

Steel Bridges

Steel Buildings

AND ALL CLASSES OF

METALLIC STRUCTURES

GENERAL OFFICES:

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WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
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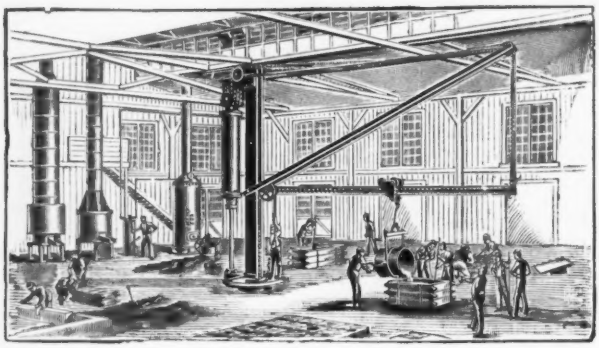
N. P. HYNDMAN, SALES AGENT.

The Poor Old Foundryman!



5-Ton Steam Hydraulic Crane in a foundry.

He got the traveling crane fever. "Cover every inch of space," "take things up and down the shop," and all that kind of thing. Spent a big lot of money putting one in. It's a dandy, too. My! don't she work nice! Picks up a ladle or a flask and walks anywhere with it. In a jiffy, too.

Just too nice for anything!

But the molders can't get the stuff up. Have to wait for the crane while the cleaners have it.

Poor fellow! he must buy another traveler. He forgot that the principal business of a crane in a foundry is not to move stuff up and down the shop, but to help the molders get up lots of work.

Wise foundrymen are putting in Ridgway Swing cranes. Of course, lots have the travelers, but they use Ridgway Cranes along the runways to help the molders put up lots of work and have it good when done. Then just one traveler will do the rest.

We would like the chance to send you to shops where Ridgway Cranes have been used for a long while so you can find out about them for yourself.

HYDRAULIC AIR HOISTS

Don't kill your men.

Get Ridgway Oil-Governed Air Hoists, which are safe and jerkless. They cost a little more to build than the ordinary hoists, but they are worth the difference in cost many times over and will save their extra cost in a day. The only successful foundry air hoist ever designed.

"PLEASE TAKE THE ELEVATOR"

THE BEST HYDRAULIC KNOWN.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandauerstr., Berlin, Germany.

William Sellers & Co., Incorp.

PHILADELPHIA, PA.

MODERN FOUNDRY MACHINERY

SAND MIXER

Not an Experiment

PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand,** we have issued a small pamphlet which will be sent on application.

Among late Purchasers are:

American Radiator Co., Buffalo, N. Y.
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Fischer Foundry & Machine Co., Pittsburg, Pa.
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U. S. Arsenal, Rock Island, Ill.
Michigan Malleable Iron Co., Detroit, Mich.
New York Air Brake Co., Watertown, N. Y.
Norfolk & Western R. R., Roanoke, Va.
And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence Is Solicited.

"THE WELLS LIGHT" REG.

WALLWORK & WELLS' PATENTS

Over 15,000 in Use.

ALWAYS READY!

800 TO 2,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y, & Treas.

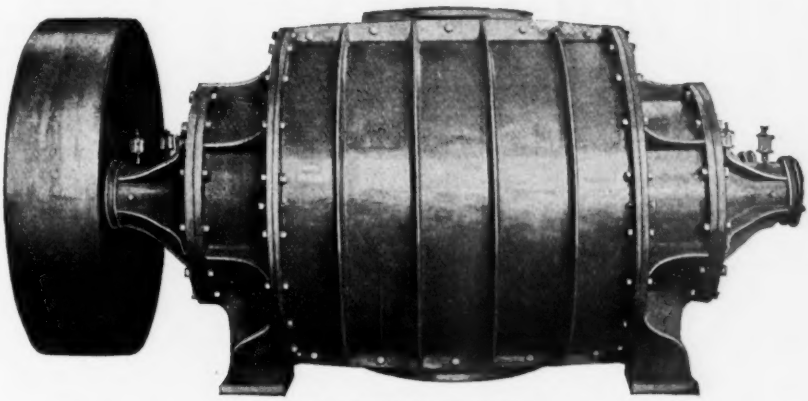
REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

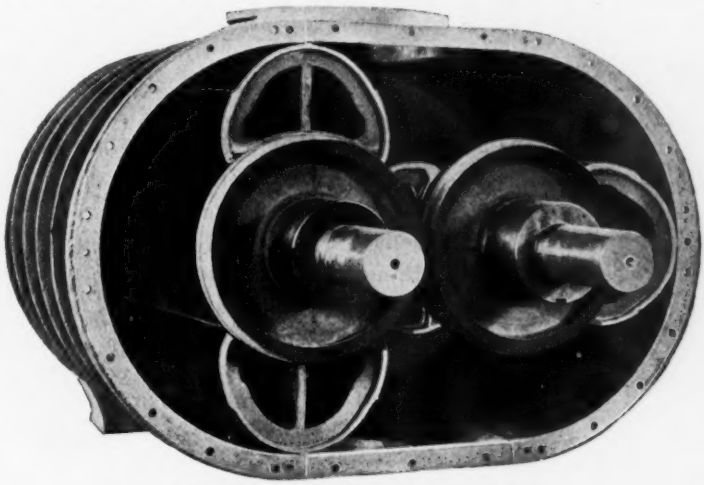
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

WOULDN'T YOU?

WOULDN'T you give most anything to be able to fix up a casting occasionally? When the man is right at the door waiting for it, isn't it a rather disagreeable duty to have to tell him that he can't have it? Of course you explain to him how the molder came to lose the casting. You tell him the core seemed to be hard, the iron refused to lay quiet on this, and the result is that the casting leaks a little bit just where this bubbling occurred. But does your customer stop to reason out the cause of your failure? Isn't it enough to him that you failed to deliver the casting when you said you would? And will he not be more than likely to shift his patronage to some other foundry on this account? Now there was no need for you to have disappointed the man. There was no need of throwing that casting away, losing cost of cores, molding and melting. One of these little cans of **Smooth-On Castings** would have made that casting as solid, as useful and as lasting as if it had been perfect in the first place, and the beauty of it is that nobody would ever have known but that it was such, unless you should tell them. **Smooth-On Castings** is the only preparation that permanently repairs defects in iron and steel castings. Do not accept imitations which are only fillers. The genuine **Smooth-On Castings** always bears this trade mark.

We also make **Smooth-On** compounds for Engineers, Steamfitters and Boilermakers. Each is adapted to its special line of work. In short, if you are troubled with leaks, either under high or low temperatures or under high pressures, write us. We can stop them. We have a booklet telling about our preparations which we would like to give you if we had your address.

SMOOTH-ON MFG. CO.,

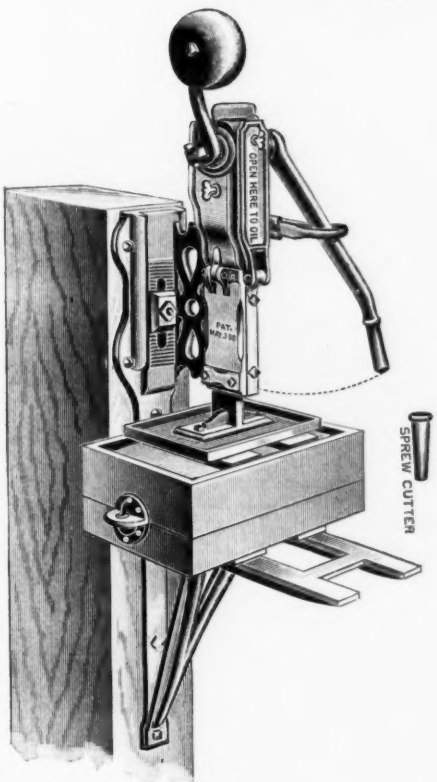
VREELAND TOMPKINS, CHEMIST AND MANAGER.

547-549 COMMUNIPAW AVENUE. JERSEY CITY N. J., U. S. A.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

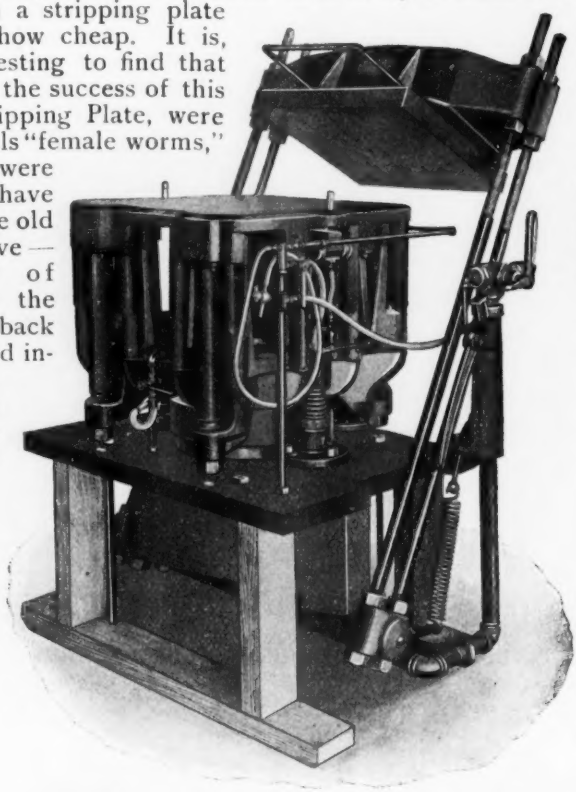
J. W. JACKMAN & CO.,
Sole European Representatives, London, S. W. Eng.

A Bit of Molding Machine History.

The first U. S. Patent for any kind of a Molding Machine was issued early in 1852 to a man named Satterlee, and it was quite a machine—seems to have been in appearance about half way between an eight day clock and a cider press—had "wheels"—of odd kinds, gear, sheave and sprocket, had pitman, levers, pawls, counterweights, chains and toggles—more gear than Kipling put into McAndrews Hymn.

All this mechanical uneasiness was to accomplish what the inventor called "the said work of sifting, filling and pressing."

Thus he omitted from the functions of a machine like a perfecting press and costing almost as much, the drawing of the patterns, the ONLY thing that some foundrymen are today buying $50 machines to do, on each of which they spend upwards of $1,000 for stripping plates and patterns. Satterlee was evidently ahead of his age in the U. S., for in England the very first idea of a molding machine, patented by one Maullin in 1800, was in effect nothing but a Stripping Plate—like some of our machines today—the $50 for machine, $1,000 for patterns kind. Maullin's machine molded screws (gimlet pointed too!), but even he in 1800 would probably have known better than to try to mold a lock case or a flat bevel gear with a stripping plate rig, no matter how cheap. It is, moreover, interesting to find that contributing to the success of this George 3rd Stripping Plate, were what Maullin calls "female worms," which, if they were not nuts, must have been limbs of the old tempter of Eve—which would of course carry the Stripping Plate back before Noah, and indicate that some of its family came through in the Ark.



This is a Vibrator Molding Machine for Flasks 26x26.

Has 12" Draft and Power Ramming.

The Tabor Mfg. Co.

ELIZABETH, N. J.

Schuchardt & Schutte, Berlin, Germany. *James Hartley & Co., of Manchester, Ltd., Manchester, Eng.*

OUR COMMERCIAL TOURIST

COMES TO YOU WITH

A Strictly Business Proposition to Improve Your Castings and Save You Money Compared with other Sand.

MASTER VAN DYE

Sand Superior for Stove Plate, Malleable Hardware, Agricultural Work Brass, Light, Gray, Iron Medium or Heavy Machine Castings, Etc.

STANDARD MOLDING SAND

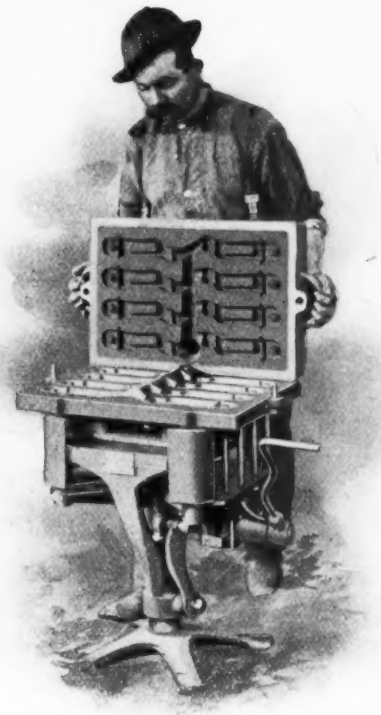
IN USE FOR FIFTY YEARS.

On account of wear and other merits of our sand, "we **guarantee** to save you money and improve the surface of your castings," by the use of same. Quality, quantity and shipping capacity being unequaled we await your orders. :: :: :: :: :: ::

THE NEWPORT SAND BANK CO.,

NEWPORT, KY.

WE WILL TELL YOU



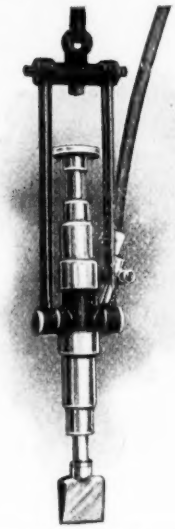
THIS MOLDER PUTS UP 200 MOLDS, AS SHOWN, PER DAY WITH THE "MAYWOOD"

where our Molding Machines may be seen in operation, if you want to convince yourself of their practicability. :: May be we can tell you of a shop in your own neighborhood, which is now turning out castings with the "Maywood." When you see what we are doing for others, you will probably be able to decide what we can do for you. Send us samples of the castings you make in large quantities. We will give you an estimate as to the cost of making them on the "Maywood."

If you are doing heavy work, large molds in green or dry sand, or loam work, where the pits must be rammed solid, you should use the

"Maywood Rammer."

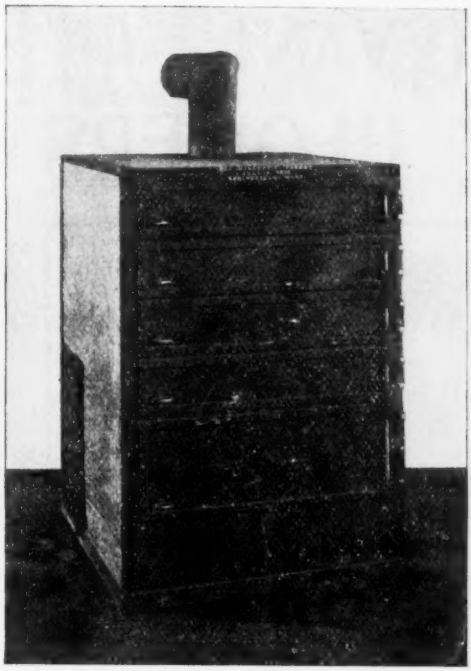
The cost of pounding sand with this machine as compared to the cost of doing the same work by human muscle is as one to ten. Ask for descriptive matter of our labor-saving appliances.



THE MAYWOOD RAMMER.

Maywood Foundry and Machine Co.

MAYWOOD, ILLINOIS.



Are You Particular About Your Cores?

Are you as particular as you ought to be. Do your castings look like they came from a foundry that understood its business? Unless your cores are perfect your castings will not be what they should. More than one shop is having trouble with dirty castings because the cores are not dried the way they should be. When the iron reaches such cores it bubbles and boils. In doing so dirt is generated. This is what the machinist finds when he cuts below the surface of the casting. Again such imperfectly dried cores cause leaky castings. If you are troubled this way look to your core oven. The cause is more likely to be there than in the iron.

The **Millett Core Oven** has now been on the market for fifteen years. Many hundreds of shops have bought them. These same shops are duplicating their orders today. That shows the "Millett" to be a paying fixture. It is the only perfect Core Oven made, it is handy, it reduces the cost of coremaking to the minimum. You should have one like all progressive foundrymen. Ask us for printed matter of the **"Millett Core Oven."**

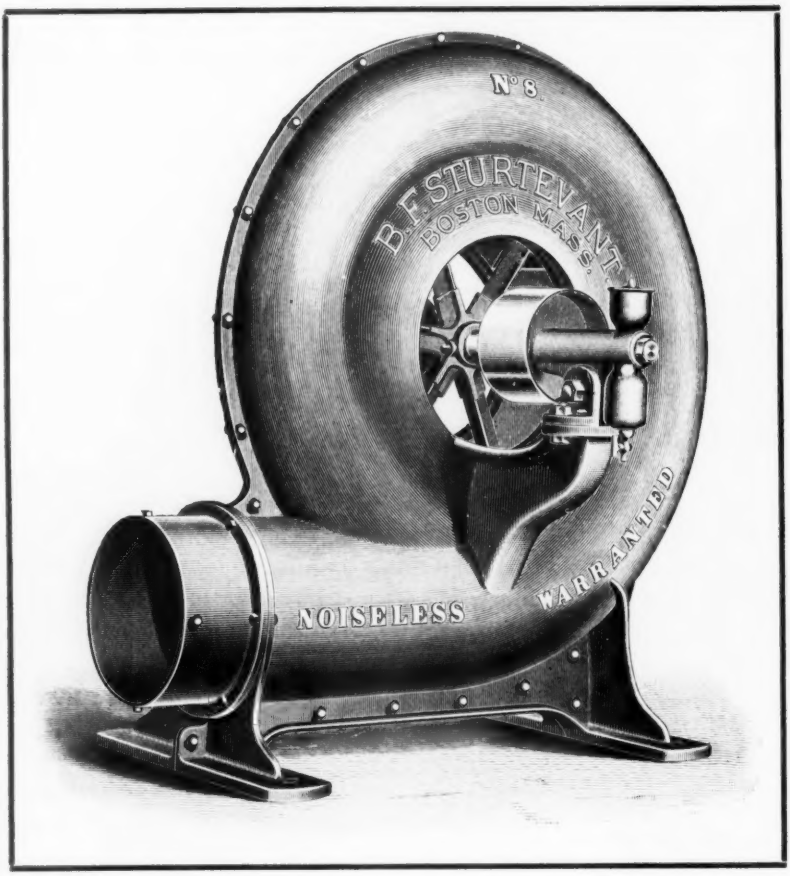
Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

STURTEVANT
FOUNDRY BLOWERS



HIGHEST EFFICIENCY. NO REPAIRS.

LEAST COST PER TON OF IRON MELTED.

Send for Catalogue No. 99.

B. F. STURTEVANT CO.,

BOSTON, MASS.

New York. Philadelphia. Chicago. London.

59

The Cost of Production

rules the price of castings. The foundry with the best equipment makes the largest profit, other things being equal.

The **Coburn Trolley Track** reduces the cost of production. It enables one man to move as much material as half a dozen with ordinary methods. Its first cost is low. There is no expense for maintenance. It is out of the way and does not interfere with other appliances. It is a speedy way of moving light and medium heavy loads. Instead of putting two big traveling cranes in your shop put in one and the **Coburn Trolley Track.** The Crane will do your heavy work, the **Coburn Trolley Track** will take care of the numerous small things which must be handled. You should not wear out expensive machinery doing the latter. You can distribute anything with the **Coburn Trolley Track.** Did you ever see them handle iron with this system? You should.

We shall be pleased to give you an estimate and furnish plans for doing your work better than you are now doing.

Coburn Trolley Track Mfg. Co.,

HOLYOKE, MASS., U. S. A.

Now IT IS Zanesville

ZANESVILLE, OHIO, is the mecca for all foundrymen who are looking for the best of Molding Sands. That is the place, and

E. M. AYERS

is the man from whom they obtain the sand that has made American castings known for their universal elegance of finish. Ayers has sand, ready for shipment, which is suited to all classes of work. You can with safety leave the selection to his judgment. He has been digging sand for about twenty-five years and comes pretty near knowing what will fill the bill. Send that order for . . . .

Ayers' Zanesville Sand

in now while we are having fine weather. You will have less water to pay for. . . . . .

E. M. AYERS,

ZANESVILLE, OHIO.

WESTERN REPRESENTATIVE:

H. S. VROOMAN, :: :: 220 West 20th Street, CHICAGO, ILL.

Any Kind of Pig Iron

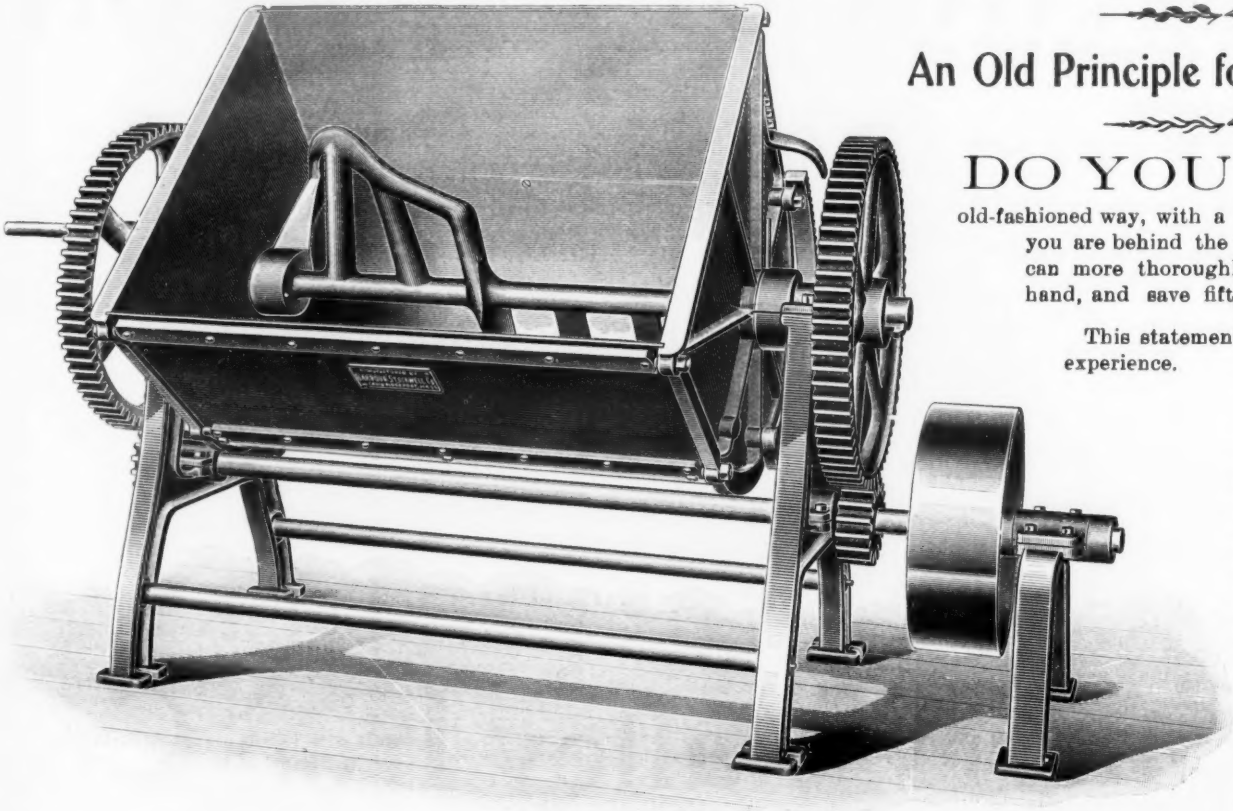
WILL do for some foundries whose class of work does not require any special quality. We want to be put in communication with foundrymen who have got to make their castings meet certain specifications as to strength and softness. If you are having trouble in satisfying your customers or in turning out castings for your own use, which are easily machined and yet strong, write us The ***CHERRY VALLEY FURNACE*** operated by us is a model furnace. Its product has been famous for many years as a foundry iron. The ore, coke and other materials entering the manufacture of Pig Iron are all selected with greatest care. Our aim is to make the best foundry iron it is possible to make. We make nothing but foundry iron

YOU SHOULD TRY A CARLOAD.

The Cherry Valley Iron Co.

Murtland Building PITTSBURG, PA.

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

DO YOU mix your facing sand, core sand, fire clay, etc., in the old-fashioned way, with a laborer and a shovel? Then you are behind the times. With this mixer, you can more thoroughly mix it than is possible by hand, and save fifty per cent. of your labor.

This statement can be verified by actual experience.

The material is shovelled into the machine or fed in through a hopper, after riddling. The machine is then started, and in five minutes the mass is perfectly mixed. Turning a crank at the side cants the machine and empties the material either on the floor or into a receptacle provided.

Capacity, 250 lbs. every five minutes.

Pulley, 24 in. diam. x 6 in. face.

Floor Space, 7 ft. x 3 ft.

Speed of Pulley Shaft, 125 revolutions.

Weight, 1250 lbs.

For further particulars, write

BARBOUR-STOCKWELL CO., 1205 BROADWAY, CAMBRIDGEPORT, Mass.

THIS LARGE PNEUMATIC RAMMER

Suspended in a pit from a light Jib or Traveling Crane and given 60 to 90 lbs. air pressure, will do the work of 8 to 12 men with one man to operate it.

THIS MAN

With our **HAND** or **FLOOR RAMMER** will do the work of from 4 to 6 men on any kind of "Floor" work or heavy loam work. Weighs 45 pounds. Strikes 250 blows per minute. Especially adapted to Ramming "CONVERTER BOTTOMS." :: :: CATALOGUE.

PHILADELPHIA PNEUMATIC TOOL CO.,

PHILADELPHIA, 21 South 12th Street. *NEW YORK,* 149 Broadway. *BOSTON,* Exchange Building. *PITTSBURGH,* Wood and Water Sts.

IT DON'T DO

HARD times again upon us indicate trouble and possibly complete annihilation for foundries not equipped with "up-to-date" apparatus for quick handling of crude and finished product. Foundries who operate by hand power cannot be in it a minute with modern equipped competitors.

We sell patent Cupolas, Overhead and Jib, Hand and Power Cranes, quick acting Ladles, quick drying Core Ovens, one man power Hoisting Blocks, Core and Casting Trucks with track, Elevators adapted to use any power, Blowers and Fans, Flexible Shafts; Quick Cleaning and Polishing Apparatus, **New and Second-Hand.** Also, best Molding and Core Sands for all classes of work; fourteen grades refined Plumbago; Best Bag Facings and Blackings; Liquid and Dry Core Compounds; Core Washes, Cupola Wash, etc., etc. **Everything you need in your Foundry.**

Write freely to-day. If we have not enough typewriters we will get more. Ask for our Second Hand List.

Lowest Prices for Best Quality.

How do you like your Coke? We sell Powellton, Mt. Carbon and Connellsville.

J. D. SMITH CO.

CINCINNATI, OHIO

If Quality

IS DESIRED, USE

Our

Crucibles.

McCULLOUGH-DALZELL COMPANY

PITTSBURG. PA.

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ELECTRIC TRAVELERS.

CRANES FOR ANY SERVICE.

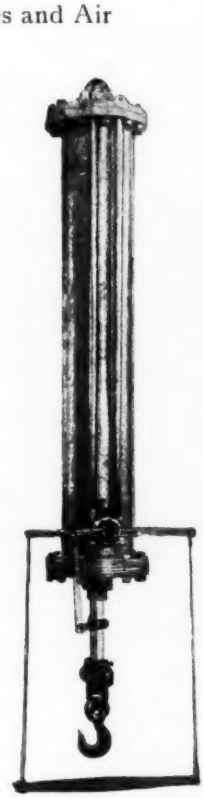
AIR HOISTS Capacities, 300 to 40,000 lbs.

Catalog No. 21 gives full description of Cranes and Air Hoists, sent free if interested.

The Whiting Cupola

600 IN USE BY LEADING FOUNDRIES.

Engineers and Designers



Complete Equipment for Car Wheel and Pipe Foundries, Malleable and Steel Casting Plants.

Ladles, Tumblers, Trucks, &c.

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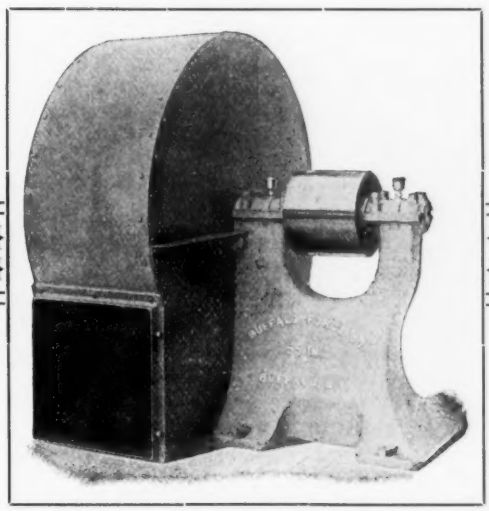
WHITING FOUNDRY EQUIPMENT CO.

GENERAL OFFICE AND WORKS;
LATHROP AVENUE, HARVEY, ILL., U. S. A. (CHICAGO SUBURB.)
CHICAGO OFFICE: 1543 MARQUETTE BUILDING.

BUFFALO TUMBLING BARREL EXHAUSTERS

A Necessity for Health and Comfort in Casting-Cleaning Rooms. Thoroughly efficient, easily applied :: :: ::



Buffalo Tumbling Barrel Exhauster

Buffalo Forge Company,

BUFFALO, N. Y.

NEW YORK. CHICAGO.

Alphabetical Index to Advertisers.

Adams Co., The 38
Addy & Co., Matthew 38
American Bridge Co. 8
American Glutrose Works 45
American Machinery Co. 33
Ajax Metal Co. 36
Ayers, E. M. 22

Barbour-Stockwell Co. 21
Barnard & Leas Mfg. Co 42
Barnett Foundry Co. 43
Brass Founders' Supply Co. 41
Buffalo Forge Co. 29

Carborundum Co. 44
Case Manufacturing Co. 43
Cherry Valley Iron Co. 23
Chicago Pneumatic Tool Co. 7
Chisholm & Moore Mfg. Co. 42
Church, S. R. ..... 35 and 38
Clayton Air Compressor Co. 33
Cleveland Facing Mill Co. 6
Clinton Iron & Steel Co. 31
Coburn Trolley Track Co. 21
Connersville Blower Co. ..... Back Cover
Cornell, J. B. & J. M. ..... 34 and 43
Cowles Electric Smelting and Aluminum Co. Inside Back Cover

Dayton Coal & Iron Co. 38
Decamp Bros. & Yule 38
Diamond Machine Co. 33
Dixon Crucible Co., Joseph 5
Domhoff & Joyce Co. 38

Fanner Mfg. Co. 45
Fox Machine Co. 42

Garden City Sand Co. 47
Gobeille Pattern Co. 34
Goff, Horner & Co. 46
Goodrich & Co., F. A. 38
Gould & Eberhardt 31

Hanna & Co., M. A. 38
Heyl & Patterson 36
Hillman & Son, J. H. 38
Holmes & Co., F. B. 35
Hunt & Co., C. W. 40

International Correspondence Schools 31

Jacobson, A. M. 37

Keep, W. J. 41

Mack, Thomas A. & Co. 38
Maurer & Son, Henry 35
Maywood Foundry & Machine Co. 18
McCormick Co., J. S. 47
McCullough-Dalzell Co. 27
Millett Core Oven Co. 19
Minerva Pig Iron Co. 39
Mohr, J. J. 39

Newport Sand Bank Co. 17
Northern Engineering Works ..... 31 and 37

Obermayer Co., The S., Front Cover and Page 1

Paxson Co., J. W. ..... 2 and 3
Philadelphia Pneumatic Tool Co. 25
Pickands, Brown & Co. 39
Peirson & Co., C. L. 35
Pilling & Crane 39
Presbrey Fire Brick Co. 35
Pridmore, Henry E. 40

Ridgway & Son Co., Craig 10
Rogers, Brown & Co. ..... 39 and 48
Roots Co., P. H. & F. M. ..... Colored Insert

Scioto Star Fire Brick Works 35
Sellers & Co., Wm. 11
Smith Foundry Supply Co., J. D. 23
Smooth-On Manufacturing Co. 14
Staten Island Clay Co. 35
Swarts Metal Co. 46
Stevenson, Field & Co. 39
Stover Manufacturing Co. 41
Stow Manufacturing Co. 37
Sturtevant Co., B. F. 24
Superior Charcoal Iron Co. 31
Syracuse Chilled Plow Co. 32
Syracuse Malleable Iron Co. 15

Tabor Manufacturing Co. 16

Vrooman, H. S. 35

Washington Coal & Coke Co. 9
Wells Light Manufacturing Co. 12
Whitehead Bros. Co. 4
Whiting Foundry Equipment Co. 28
Wilbraham Baker Blower Co. 13

CONTENTS.

The Flux Fakirs Latest 91
Trade Outlook 91
Some Ideas of To-day 92
Care of Tools. L. C. Jewett 94
Kranks' Korner 95
Two Ways of Doing the Same Job. Illustrated. Henry O'Neil 96
Cupola Fuels. Edward Kirk 98
Two Cheap Rigs. Illust. H. Fisher 100
Foreman or Chemist. P. Longmuir 103
Hammer Core Machines. Illust 105
Engine Building Moving West 106
Machine Foundations 107
Protection of Blast Furnace Linings. Illust. S. S. Hartranft 108
Twenty-three New Furnaces 110
Trusts, Labor Unions and Arbitration 110
Mixing Iron by Analysis. W. G. Scott 111
Characteristics of Malleable Iron. E. C. Wheeler 116
Basic Furnace for Malleable Iron. Benj Talbot 124
Strike Epidemics 125
Chester's Steel Industries 126
Founding in the Ozarks. C. Ritic 126
Expired Patents. A. E. Fay 127
A Cast Iron Man's Nightmare 128
Deaths 129
Litharge Oil Matches 129
Cupola Explosions. E. H. Putnam 129
The Position of Cast Iron 130
Straight Castings. R. D. Moore 131
Cincinnati Foundries 133
Fires 135
Among the Foundries 136
Pointers on Foundry Practice 137
Notes from Various Sources 138

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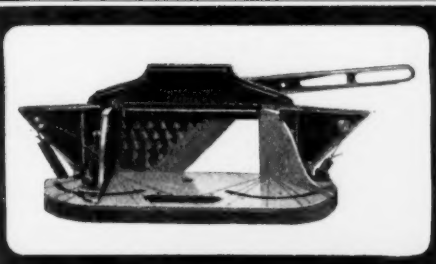

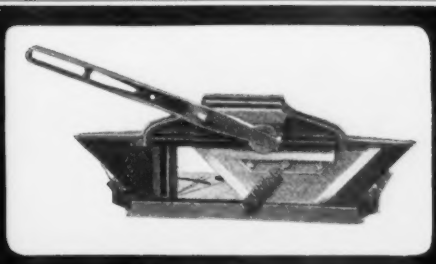

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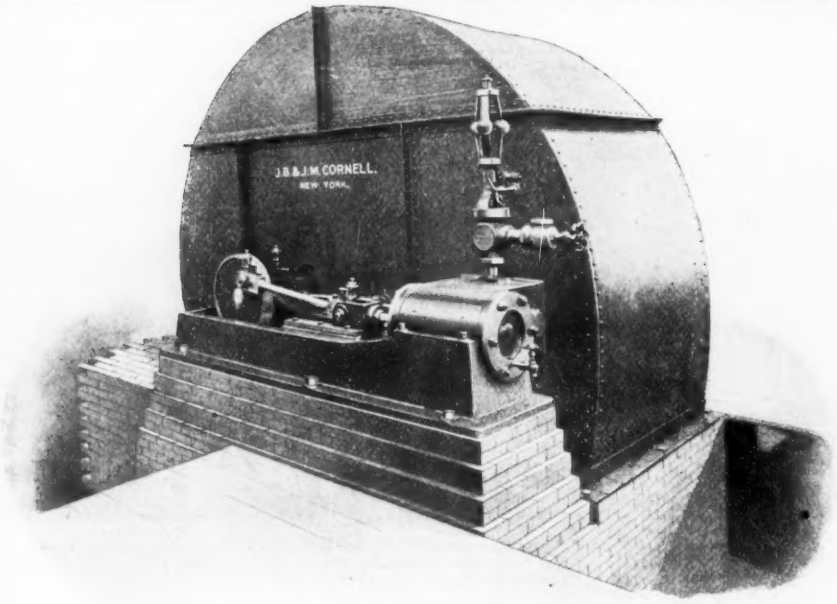

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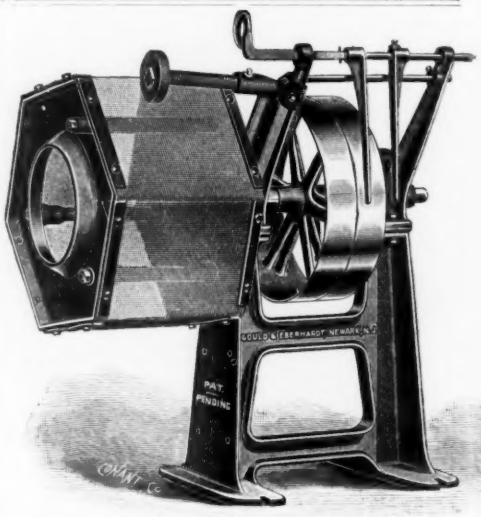

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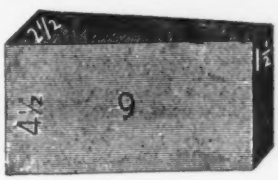

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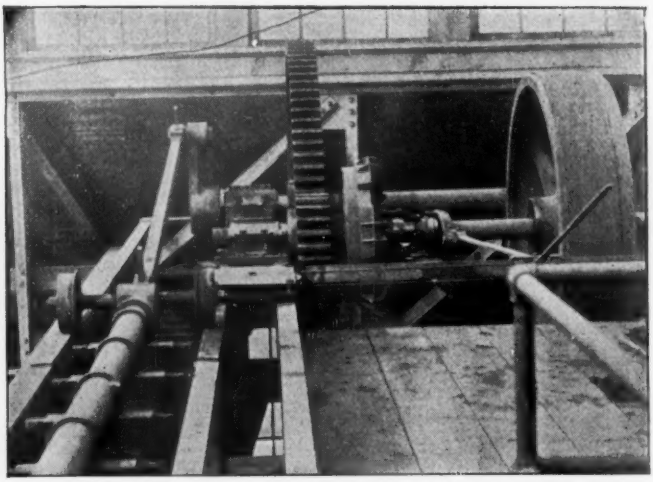

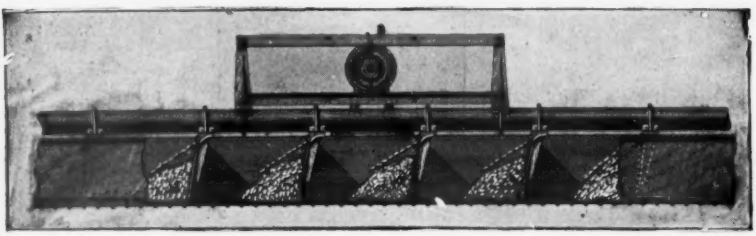

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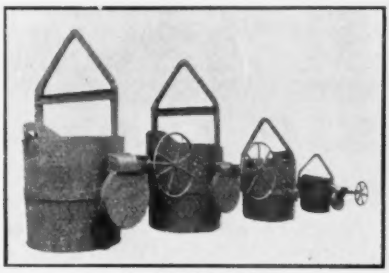

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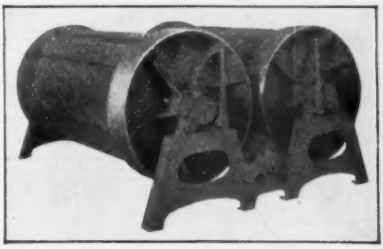

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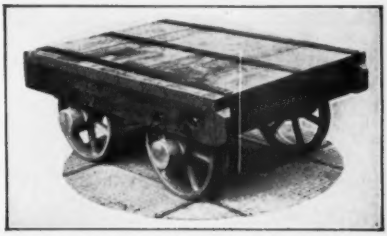

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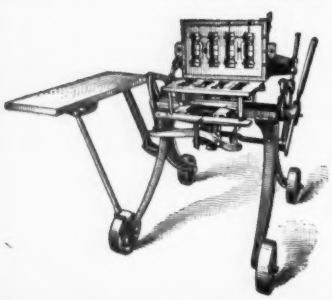

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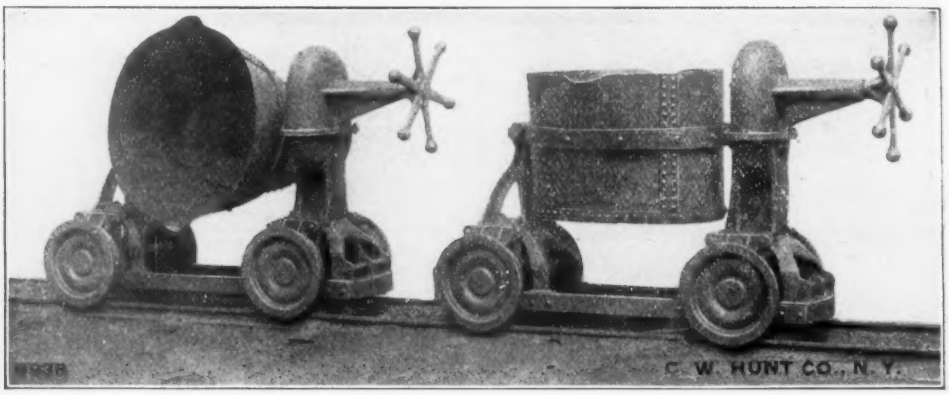

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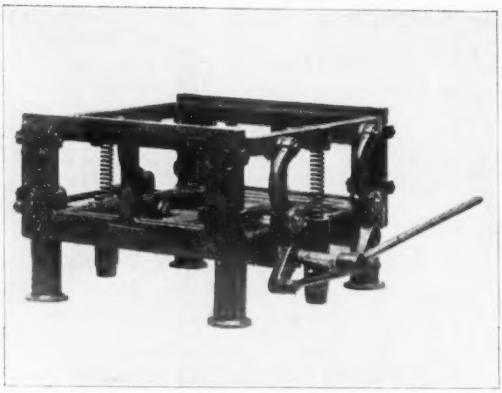

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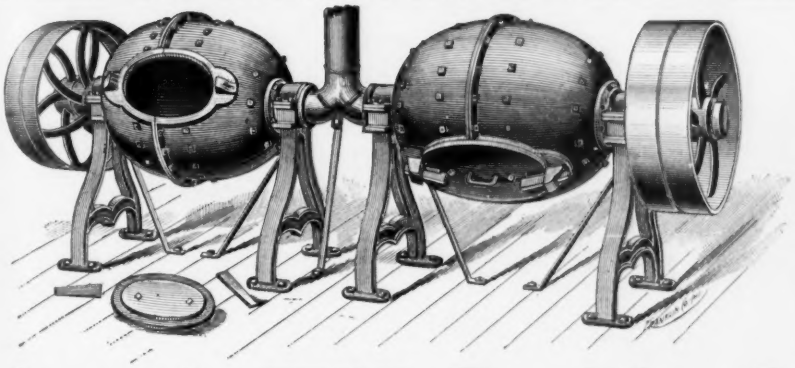

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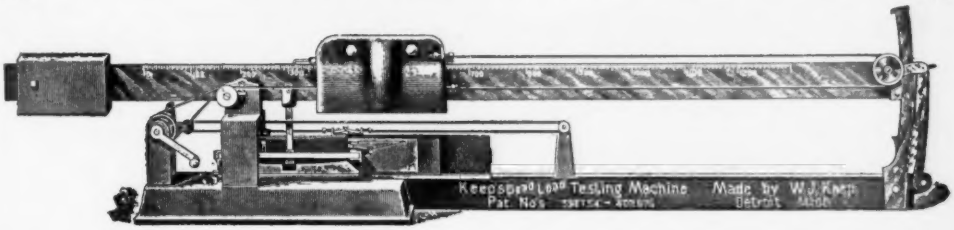
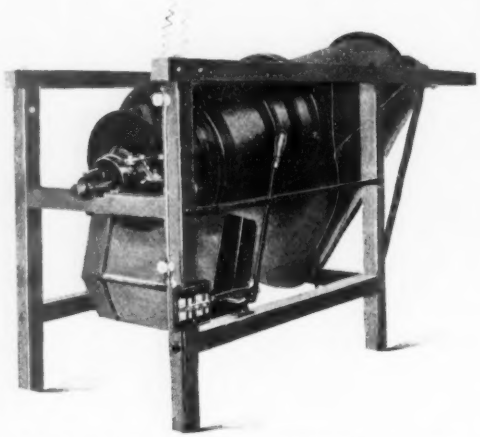


The Only Practical Method for . . . . MAKING CASTINGS OF A DESIRED QUALITY AT A LOW PRICE. ✻

Send for Testimonials and for Description of

W. J. KEEP, Detroit, Mich.

KEEP'S TEST APPARATUS.



Save Your Iron

Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months.

EDWARD H. SLEIGHT, Prest. & Treas. HENRY H. LAGE, Secretary.

MOLINE PUMP COMPANY.

MOLINE, Ill., Sept. 17th, 1900.

Barnard & Leas Mfg. Co., Moline, Ill.

Gentlemen:—In accordance with our contract, that in case you could show on test of your Magnetic Separator, that it would net us fully 25% each year on the investment price of $300, that we would order one, we hereby enclose order for one Magnetic Separator and have to report as follows as to result of test:

We saved up the waste from our foundry and cupola for five heats (we melting every other day or three times a week and averaging some 5,000 lbs. of iron each heat.) This waste saved from the five heats weighed 8350 lbs., and on running it through your machine it separated and saved 1201 lbs. of iron.

On this showing we calculate the machine ought to net us after deducting all expenses of operating same, at least 35% each year on the cost price of $300. We consider this a strong test of the machine, as we had our cupola and other waste well picked over by hand before putting it aside for the trial test, and furthermore before the test was made we fully believed that our waste of iron was so small that it would not warrant us to buy one of your machines at any price. Very truly yours, MOLINE PUMP COMPANY,

E. H. SLEIGHT, Prest. & Treas.

Give this machine a trial. The saving will surprise you. Write for prices and discounts.

Barnard & Leas Mfg. Co., *Mill Builders and Mill Furnishers, MOLINE, ILL.*

FOX THE ORIGINAL WOOD TRIMMERS

No. 4 A Cut 4 in. high, Cut 8 in. long. **8,000** this size alone in use.

This size should be on

Every Pattern Makers Bench.

We make larger ones for heavier work.

The Time Saved by FOX TRIMMERS

pays for them in a very few months.

Ten Sizes

12,000 Sold

ANY SIZE ON TRIAL

New complete Catalogue just out. Write for one.

Drills, Shapers, Milling Machines

No. 6 E Cuts 6 in. high. Also a very popular size.

FOX MACHINE CO., 850 N. Front St., Grand Rapids, Mich.

CRANES

HAND POWER AND PNEUMATIC.

CHAIN HOISTS

THE CHISHOLM & MOORE MFG. CO.

CLEVELAND, O.

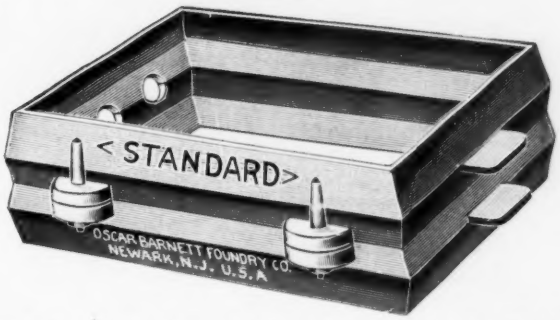
MALLEABLE IRON CASTINGS,

THE CHISHOLM & MOORE MFG. CO.,

CLEVELAND, OHIO.

WE ARE FOUNDERS, THE KEY TO PROMPT DELIVERIES.

Interchangeable Steel Pins



Perfectly Fitted All Faces Level

Our Testimonial. The Oscar Barnett original **<STANDARD> BEVEL FLASK,** our product the last fifty years, requires no ribs, sales increasing yearly. Why use inferior grades? We guarantee ours! Complete Equipment Catalogue for the asking.

THE PLEASURE OF SUBMITTING PRICES IS SOLICITED.

N. B.—Always state exact depth of Pin Part and other Half Flask, also width and length inside at parting.

MANUFACTURERS OF HARDWARE AND TOOLS.

Oscar Barnett Foundry Co.,

L. D. PHONE 1045. Bruen, McWhorter and Hamilton Sts., Newark, N. J., U. S. A. ESTB. "45"

STEAM CRANES ELECTRIC

BELT & HAND POWER HOISTING APPLIANCES.

CAGE MANF'G. CO. COLUMBUS, O.

CCC

CORNELL'S CORE COMPOUND

Cornell's Core Compound

Milligan's Pat., July 17, 1900.

You will never know how easy it is to make good cores until you have tried Cornell's Core Compound. Ask for a sample. :: ::

J. B. & J. M. CORNELL
NEW YORK CITY.

THE TEST OF ACTUAL USE.

That is what counts.
Special tests are all right in their way—but it is the regular day-after-day work that proves the value of a machine, or a man.

CARBORUNDUM

is in actual use in thousands of shops and factories all over the country.
Here is a sample of what the users say of it:

"We have been using Carborundum Wheels for over two years, and find that they cut faster than any other abrasive we ever tried. They cost more, but we are satisfied that the results show them to be cheaper in the end."

Barnes Mfg. Co., Mansfield, O.

And that is the universal verdict. Shall we send further proof?

The Carborundum Company,
Niagara Falls, N. Y.

BE UP TO DATE AND GET THE BEST

Have you seen it imitated? Why is it done?

Because no one imitates a low standard. The Rib Flask has merits that no others possess.

Latest Improvements

Best Results

A Very Large Stock *means prompt delivery.*

U *ought to have a Separator. Send for Circular.*

Guaranteed

Perfect

THE BRASS FOUNDERS SUPPLY CO.,

NEWARK, N. J., U. S. A.

A Good Opportunity

for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

The business has been established since 1868 and is in a paying condition.

A full chance is offered intending purchasers to investigate. Address,

FOUNDRY AND MACHINE SHOP,
Box 309, care The Foundry,
DETROIT.

FOUNDRIES

that use

F·L·O·U·R

for their

C·O·R·E·S

and have no

B·L·O·W·S

don't make any

CASTINGS

Write for one of our little booklets and see what we say about . . . . .

BLOWS

when using our Glutrose Core Compound

American Glutrose Works

12 and 14 George St., Camden, N. J.

Your Blacksmith

HASN'T got the tools for making Chaplets. Then how in the world can you expect him to make a decent Chaplet? You wouldn't think of making your own nails would you? Of course it wouldn't pay you. Neither does it pay you to make or use the misfit Chaplets you now have. Send for our catalogue of Chaplets, which shows styles suitable to a great many classes of work. If you need something special in this line we will make it for you. . . .

... THE ...

Fanner Mfg. Co.,

Brookside Park,

CLEVELAND, OHIO.

Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

Swarts Metal Refining Co.

SMELTERS AND REFINERS

WE are supplying brass foundries throughout the country with our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We also carry a stock of the best makes of Crucibles at the lowest prices.

Try a small barrel of our Iron Flux at seven (7) cts. per lb. for the purifying and removing of Iron in the making of Brass Castings.

We also supply brass foundries with Scrap Metals of all kinds, at the lowest market prices, put up in crucible shape, if so desired.

Main Office and Works, 18-20 N. Desplaines St.,

ESTABLISHED 1885
INCORPORATED 1895

CHICAGO, ILL.

CORRESPONDENCE SOLICITED.

COKE

"ALEXANDRIA," High Grade, Low Sulphur, FURNACE and FOUNDRY COKE.

Made exclusively from washed coal. Special care taken in grading and selecting for **FOUNDRY** use.

HIGHEST QUALITY. LOWEST PRICES.

SATISFACTION GUARANTEED.

WRITE

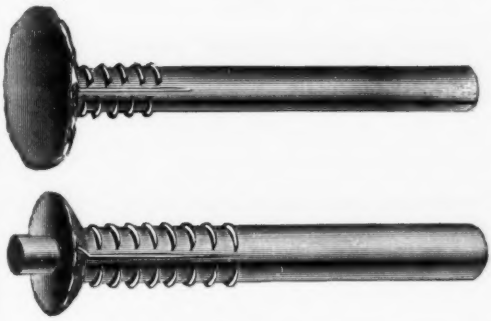
Goff, Horner & Co.

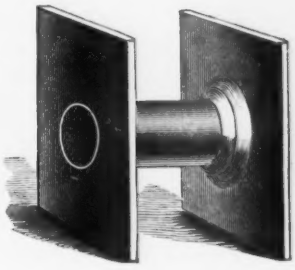
PIG IRON, STEEL, COAL and COKE

308-309-310 Lewis Building, PITTSBURG, PA.

CHAPLETS

ALL KINDS AND SIZES.



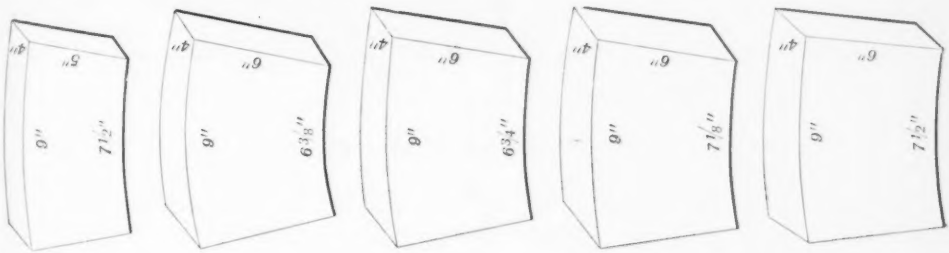


J. S. McCormick Co.,

Foundry Supply House PITTSBURG, PA.

A GOOD TIME

TO MAKE A TEST OF CUPOLA BLOCKS WOULD BE THE PRESENT



Why not learn whether you are wasting or saving money in the use of the brand you are now using. Let us furnish you a trial lot of **Dome Blocks.** We know we can save you money in first cost and furnish a Special Block, the very best obtainable. ***We are not guessing, we know it.*** **Our Molding Sand, Fire Clay, Loam, etc.,** are all first class. Can't we send you samples. :: :: :: ::

The **Garden City Sand Co.** 3 TELS. ALL M 4827. 188 Madison Street, CHICAGO.

ONLY A FEW DAYS

Before the result of the elections will be announced. Unless all present indications are worthless, there is to follow a general revival of demand and increased activity in the iron business.

Prices of Pig Iron and Coke

have reached such a low level that every foundryman can now afford to keep a few carloads in stock and it is our advice that they forsake the hand-to-mouth policy that has prevailed for several months. The Railroads tell us that they are thousands of cars short of the necessary number to transport current business, and the cotton movement has not fairly begun. There is bound to be trouble about deliveries later. **Carry enough Pig Iron and Coke** on hand to save you from worry. If you have not already bought it please send your orders to

Rogers, Brown & Co.

CINCINNATI	NEW YORK	CHICAGO
BUFFALO	PHILADELPHIA	PITTSBURG
CLEVELAND	BOSTON	ST. LOUIS
	BIRMINGHAM	

This is a reduced Copy of our "Ad" as it appeared on the front cover of the first issue of THE FOUNDRY.

THE FOUNDRY

VOL. I. SEPTEMBER, 1892. NO. I.

The Largest and Most Reliable Foundry Supply Manufacturers of the World.

The S. Obermayer Co

CINCINNATI, OHIO, U. S. A.

MANUFACTURERS OF

Foundry Facings
Foundry Supplies
Foundry Equipments

PLUMBAGO AND SILVER LEAD.

We can supply you with anything you may need in your Foundry.

WRITE FOR CATALOGUE. NO CHARGE FOR TRIAL SAMPLES

We Still Occupy the Leading Position

in our Line. Our Goods are in use now all over the world and give Satisfaction Everywhere.

The S. Obermayer Company,

CHICAGO, ILLS., LARIMER, PA., CINCINNATI, O., U. S. A.

TO THE FOUNDRYMEN OF THE UNITED KINGDOM

We beg to advise that we now carry a large and complete stock of our celebrated

East India Plumbago

Founders Peerless Perfect Wash

India Silver Lead

and other Facings and Blackings in LONDON and GLASGOW, ready for delivery in any quantity from a barrel to a car load.

SAMPLES AND PRICES ON APPLICATION

Our manufactures have been the standard for thirty years the world over, and we guarantee them to give perfect satisfaction. Our special catalog of modern and improved foundry requisites of every description will give you all the information.

CORRESPONDENCE SOLICITED.

THE S. OBERMAYER CO.

CHICAGO, ILL. — No. 60 St. Enoch's Square, GLASGOW.

CINCINNATI, O. — No. 39 Victoria Street, LONDON, S. W.

OUR MOTTO:

"Everything You Need in Your Foundry"

Is so identified with the name of :: :: :: :: ::

The S. Obermayer Co.

that it means one and the same thing to a great many foundrymen in every section of the country, **because** we are the only Foundry Facing, Supply and Equipment house that carry everything in stock ready for shipment. :: :: :: :: :: ::

Besides being the largest manufacturers of Foundry Facings and the largest importers and refiners of East India Plumbago, Graphite and Silver Lead, **we are the representatives and sales agents** of most all the prominent manufacturers of modern foundry appliances in the United States. :: ::

A few among the many we represent and of whose goods we have always a complete stock are the following: ----------

Whiting Foundry Equipment Co.,	Cupolas, Ladles, Furnaces, Etc.
Millett Core Oven Co., . . .	Core Ovens
Henry Pridmore, . .	Pridmore Molding Machines
Ezra Sawyer, . . .	Magnetic Metal Separators

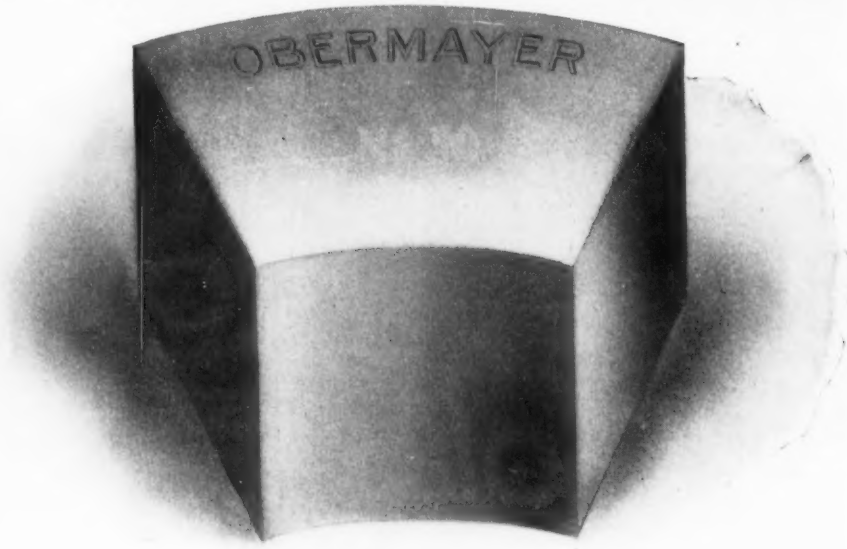
Peerless Rosin Grinders
Orbison's Garnet Woodworking Machine
Alex Thompson's New Malleable Flask Clamps

And many other useful and money saving Foundry Equipments.

Send for General Catalogue No. 30 for full information.

The S. Obermayer Co.

CHICAGO, ILL. CINCINNATI, O.



Obermayer Cupola Blocks

Give better results than any other.

IF you are buying other goods from us, why not give our Fire Brick, Cupola Blocks and Fire Clay a trial. We can make up a combination Car load of Facings, Supplies, Brick and Clay, and ***save*** you thereby ***one-half*** of the ***cost.*** :: :: :: :: We carry at all times a large stock of all sizes of Cupola Blocks and Fire Brick on hand. :: :: :: :: ::

All orders filled same day we receive them.

THE S. OBERMAYER CO.

CHICAGO, ILL. CINCINNATI, O.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

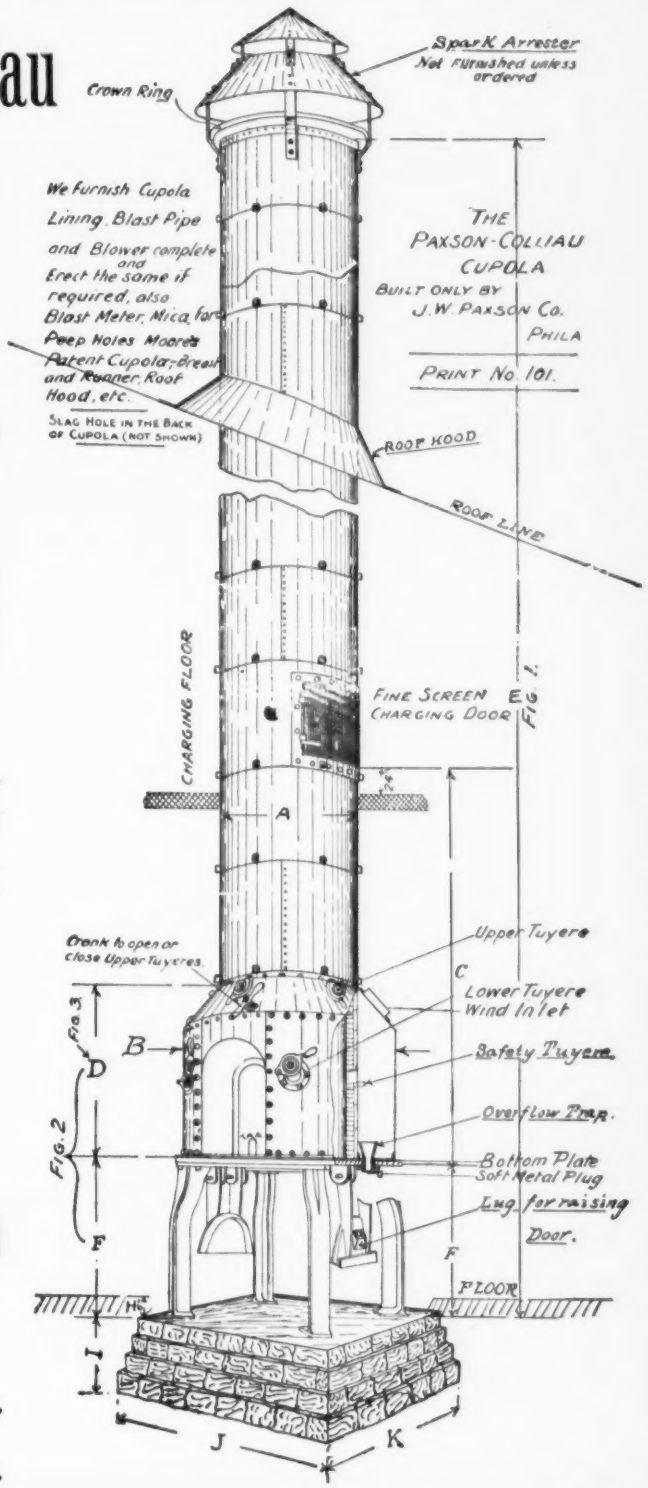
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J.W. Paxson Co.

1021 . . .
North Delaware Avenue,

PHILADELPHIA, PA., U. S. A.



DO YOU USE "IT"?

We are frequently asked "do you make this and that brand of

"CHEAP LEAD?"

If you were aware that we are the largest miners and grinders of ***PLUMBAGO*** in the United States you would not ask the question, but would ask for a working sample of our

XX CRUCIBLE LEAD @ 2½ Cents per Lb.
X CRUCIBLE LEAD @ 2 " " "

F. O. B. Philadelphia, which we will express to you "no charge here" for sample package. Don't forget we also dig

"THE" MOLDING SAND

See our No. 11 Catalog for **Foundry Supplies and Modern Equipment**

J. W. Paxson Co.

1021 N. Delaware Ave., PHILADELPHIA, PA., U. S. A.

WHITEHEAD BROTHERS MOLDING COMPANY.

SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
NEW YORK.

PROVIDENCE OFFICE.
42 S. WATER ST.

BUFFALO OFFICE.
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITON RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L.I.
WATERFORD, N.Y.
ALBANY, N.Y.
CEDAR HILL, N.Y.
COXSACKIE, N.Y.
CLINTON POINT, N.Y.
ATHENS, N.Y.
COEYMANS, N.Y.
WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.

It's UP TO YOU

WHETHER you will use poor substitutes instead of the genuine Dixon silver lead facings and blackings. :: A member of the American Foundrymen's Association at the June Convention said:

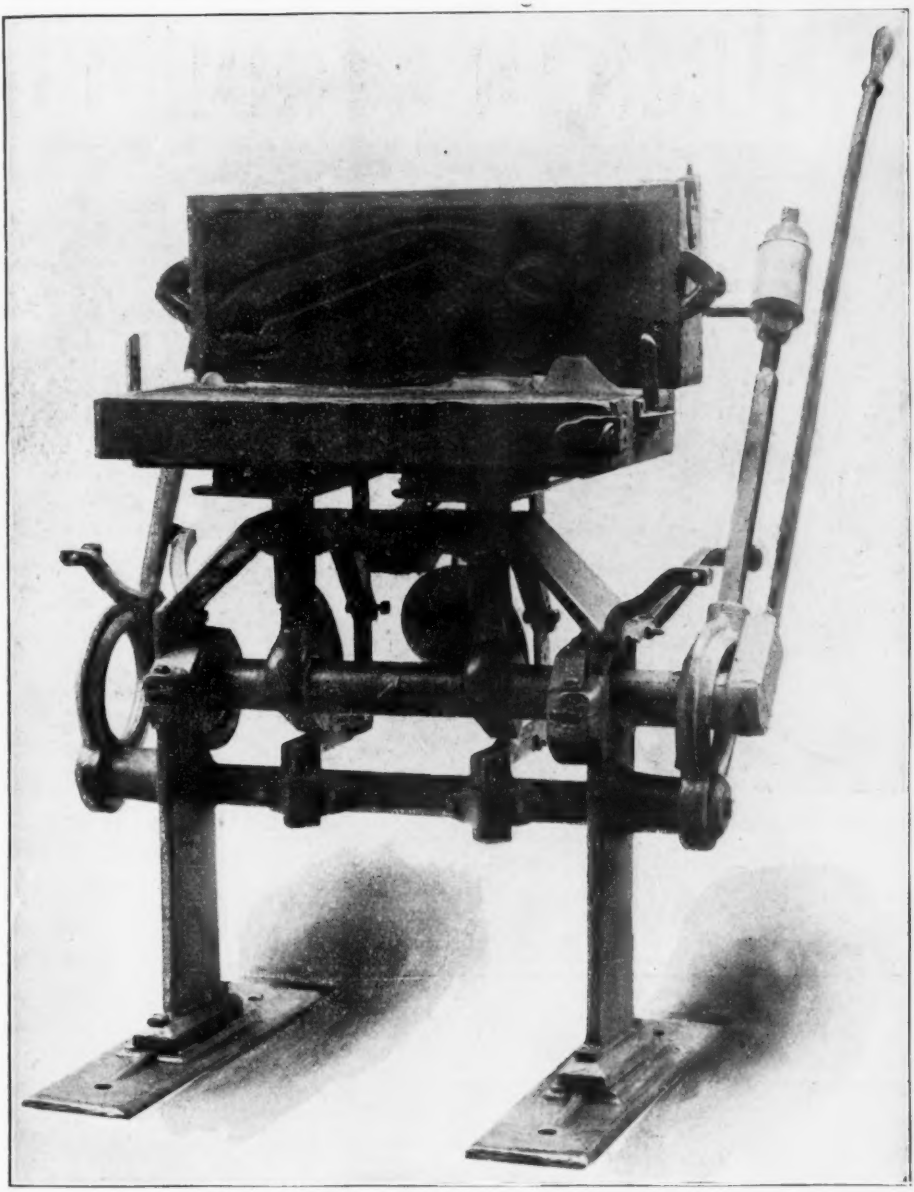
> "The blackings of the present day are composed to a great extent of common cement, pulverized anthracite, charcoal, soapstone and other cheap minerals, and it is a question if they do not cost more than they are intrinsically worth."

If you figure up how much longer it takes a molder to properly slick up a mold with a poor blacking—even if he can at all—you will probably find as others have that it will pay you to use one of the pure plumbago blackings made by Dixon. Castings are harder to clean with poor blacking. If the sand fuses it is due to poor blackings. Molder's extra time costs money. It costs more to clean castings than difference in price of blacking. Bad blackings make bad work and bad work often loses a customer. :: Every foundryman should strive to have his shop known for turning out the best work. :: If you will write us we think we can help you toward better work at less cost. :: "It's up to you."

Joseph Dixon Crucible Co.

JERSEY CITY, NEW JERSEY

The Wachalec Molding Machine



The most efficient Molding Machine in the field to-day. Three hundred are already in use. For sale by :: :: :: ::

The Cleveland Facing Mill Co., CLEVELAND, OHIO.

MANUFACTURERS OF

FOUNDRY FACINGS AND FOUNDRY SUPPLIES.

CHICAGO PNEUMATIC TOOL CO.

Pneumatic Tools in designs and sizes for **Foundry Work.**
Our Customers say: "They go beyond guarantee."

One man does the work of four with our :: :: :: :: ::

Chipping Hammers

For drilling, reaming and tapping use our :: :: :: ::

AIR DRILLS . . .

They are especially valuable on heavy work not readily put under your drill press, and drill and ream up to 3 inches in diameter in iron and steel. :: :: :: :: :: ::

Air Compressors and Hoists

We send our tools on trial subject to approval. :: ::

New York Offices:
95 LIBERTY ST.,
NEW YORK.

General Offices:
MONADNOCK BLDG.,
CHICAGO.

AMERICAN BRIDGE CO.

GENERAL OFFICES

100 Broadway, NEW YORK, N. Y.

DESIGNERS AND BUILDERS OF
ALL CLASSES OF

Metallic Structures

WE have decided to carry a large stock at all our plants of Raw Material, from which we can furnish with great promptness any ordinary order for Steel Bridges, Roofs, Buildings, Columns, Girders, Beams, Channels, Angles, Plates, etc.

BRANCH OFFICES AND WORKS:

Albany, N. Y.	*Canton, O.*	*Lafayette, Ind.*	*Seattle, Wash.*
Athens, Pa.	*Cleveland, O.*	*Milwaukee, Wis.*	*San Francisco, Cal.*
Boston, Mass.	*Denver, Colo.*	*Minneapolis, Minn.*	*Salt Lake City, Utah.*
Buffalo, N. Y.	*Duluth, Minn.*	*New Orleans, La.*	*Sidney, N. S. W.*
Baltimore, Md.	*East Berlin, Conn.*	*Pencoyd, Pa.*	*Trenton, N. J.*
Butte, Mont.	*Elmira, N. Y.*	*Philadelphia, Pa.*	*Wilmington, Del.*
Columbus, O.	*Groton, N. Y.*	*Pittsburg, Pa.*	*Youngstown, O.*
Chicago, Ill.	*Horseheads, N. Y.*	*Rochester, N. Y.*	*London, Eng.*

M. M. COCHRAN, PRES.
W. HARRY BROWN, V.-PRES.

JNO H. WURTZ, SECY.-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

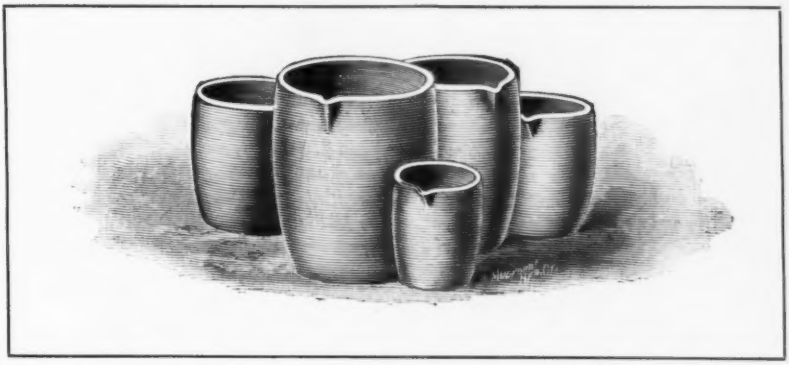
GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

BRIDGEPORT CRUCIBLE CO.

MANUFACTURERS OF

BLACK LEAD CRUCIBLES



Climax Furnace Clay

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U. S. A.

William Sellers & Co. Incorp.

PHILADELPHIA, PA.

MODERN FOUNDRY MACHINERY

SAND MIXER

Not an Experiment

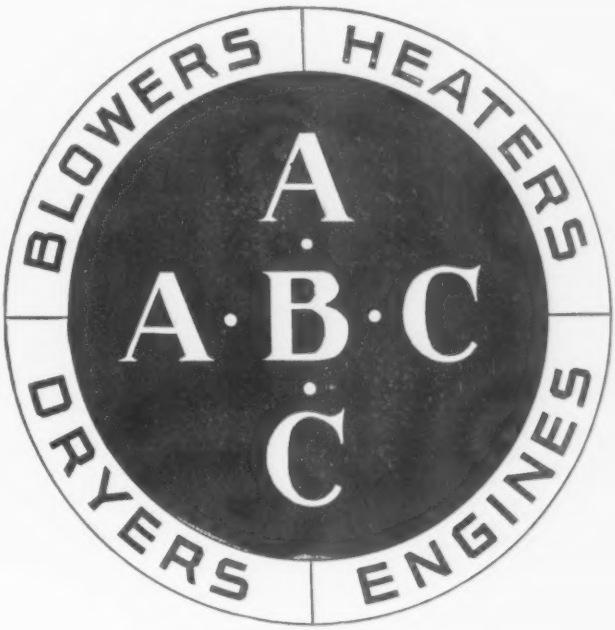
PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand,** we have issued a small pamphlet which will be sent on application.

Among late Purchasers are:

American Radiator Co., Buffalo, N. Y.
American Radiator Co., Titusville, Pa.
National Malleable Castings Co., Indianapolis, Ind.
National Malleable Castings Co., Cleveland, Ohio.
Fischer Foundry & Machine Co., Pittsburg, Pa.
R. Hoe & Co., New York.
U. S. Arsenal, Rock Island, Ill.
Michigan Malleable Iron Co., Detroit, Mich.
New York Air Brake Co., Watertown, N. Y.
Norfolk & Western R. R., Roanoke, Va.
And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence Is Solicited.



It is a fact conceded by all who have investigated the subject, that the Fan System is the method best adapted for Heating and Ventilating Foundries and Machine Shops—in fact, manufacturing buildings of all types.

For design, finish and efficiency the "A B C" Hot Blast Apparatus is superior to all others. This Apparatus, coupled with a scientific layout, insures a thoroughly reliable and economical plant.

American Blower Company

DETROIT, MICH.

NEW YORK CHICAGO LONDON

BESSEMER COKE CO.,

MANUFACTURERS OF THE

CELEBRATED

Connellsville Coke

MINERS AND SHIPPERS OF COAL.

Furnace, Foundry and Crushed Coke.

Special attention given to Foundry trade. Quality guaranteed satisfactory. Annual capacity 700,000 tons. Individual cars. Connections with all railroads entering the Connellsville Region.

*****

For Blast Furnaces running on special low Phosphorus Bessemer Pig Iron, we are prepared to furnish Coke running over 88.50 per cent. fixed Carbon, below .72 per cent. in Sulphur and .007 per cent. Phos.

Main Office: - - Lewis Block, PITTSBURG, PA.

MINES AND WORKS: CONNELLSVILLE REGION.

CARBORUNDUM

Speed and Endurance

What makes an abrasive worth the money you pay for it?—
Rapid work and long life—
Test Carborundum along these lines—
Set it up alongside other abrasive wheels—try it in actual shop practice.

If it doesn't do more work,—cleaner work,—if it doesn't last longer and give better satisfaction all around—the trial won't cost you a cent.

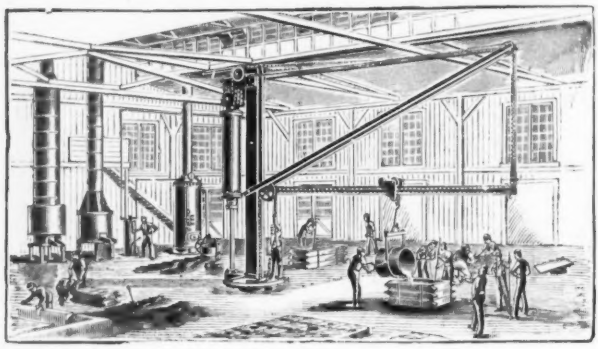
Carborundum is the hardest of all abrasives. Its small, diamond like particles break in use just enough to keep the cutting edge always sharp and fresh—
It never grows smooth or gummy, can be used either wet or dry—does not heat the work—
Costs a little more?—Yes, in the first place—but it's by far the cheapest in the end.

Write for the illustrated booklet.

The Carborundum Company,

Niagara Falls, N. Y.

"Hook 'Em to Your Biler"



5-Ton Steam Hydraulic Crane in a foundry.

Founders who have them say the Ridgway Balanced Steam Hydraulic Cranes enable the molders to turn out 50 per cent. more work for the same wages.

Don't believe a word of it, do you?

Whether that is an exaggeration or not they show their sincerity by continually getting more and more cranes.

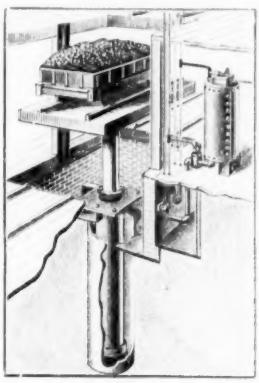
Just this minute we are making the fourth lot of them for one of the biggest foundries in the land.

Yes, you can run them with compressed air if you like, but steam is cheaper and better. Suppose you had a 10 ton ladle of metal on hand and the old compressor would break down! With steam the crane is independent of everything but the boiler.

Every foundryman ought to know this crane. Its reputation and popularity is greater today than ever. It is going into best shops.

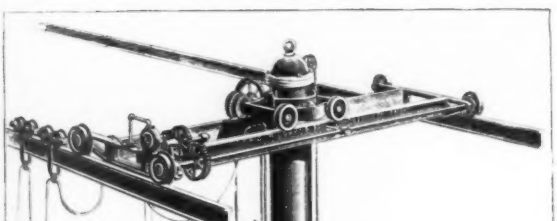
"PLEASE TAKE THE ELEVATOR"

A most perfect hydraulic elevator without a pump. Uses 60 per cent. less steam than pump driven hydraulic. Attaches right to the boiler and is always ready for business. Is made also to set on the floor without any well digging. This is the greatest cupola hoist ever invented. It is fully covered by our steam hydraulic patents and is being placed in foundries all over the land. It is cheap for a hydraulic elevator, costing but little more than pumps and tanks alone of the usual hydraulic system. Can be operated by air or steam but steam is cheapest and best.



Steam Hydraulic Cupola Hoist, Plunger Type.

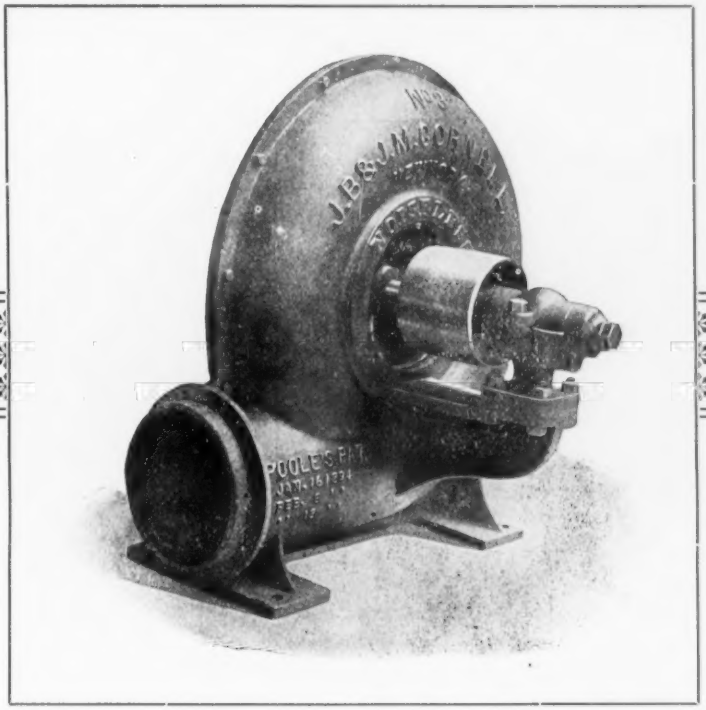
Oil Governed Air Hoists



This is the only successful Foundry Air Hoist ever designed. It is an outgrowth of our wonderful Foundry Crane. We accomplish the same perfect motion in a different way. This hoist will handle the most delicate molds perfectly. No jerks or irregularity. When other hoists have been failures this will be found the ideal machine. Costs more to make than other hoists but is worth it. Get one and try it. If you don't like it send it back.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT, CHAS. G. ECKSTEIN, 16 SPANDAUERSTR., BERLIN, GERMANY.



Record of 48 in. Cupola, February 21st, 1900, working with blast supplied exclusively by

ONE No. 8

Cornell Blower

Iron Melted, - - - -	104,000 lbs.
Fuel Consumed (including 1,500 lbs. used in making bottom) - -	9,300 lbs.
Ratio of Fuel to Iron, - - -	1 to 11.18

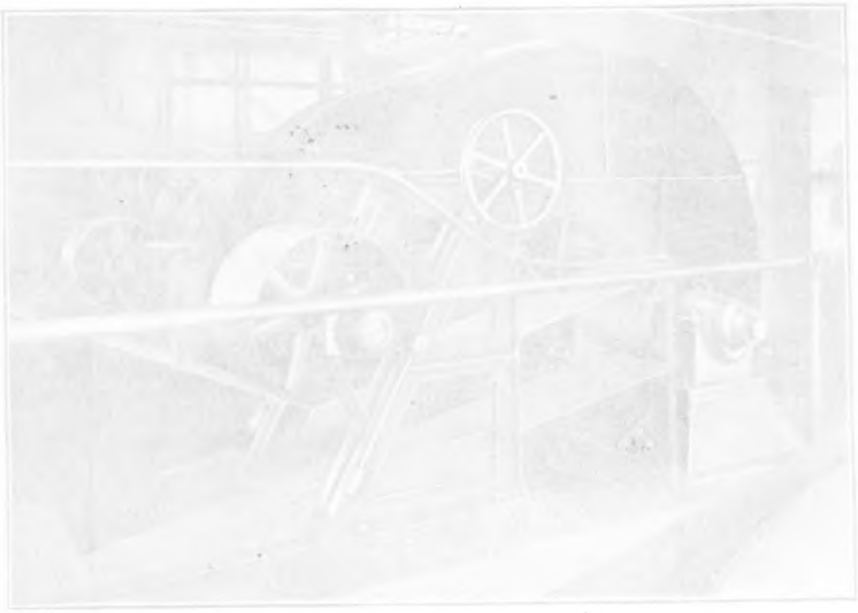
The metal was carried over 450 ft. and cast into pieces varying in weight from ½ lb. to 24,000 lbs. each, including 12 columns 15 ft. long.

Rate of melting, 10 tons per hour.

Can any other make of Blower Equal this Showing?

J. B. & J. M. CORNELL, 26th Street and 11th Ave., NEW YORK CITY.

The Cornell Blowers do the Work



NEW AMSTERDAM GAS COMPANY.

150 THIRD AVE., NEW YORK CITY, July 16th, 1900.

Messrs. J. B. & J. M. Cornell, 26th St. and 11th Ave., New York City.

Dear Sirs:—I take pleasure in stating that the two large steel blowers which you furnished for our Ravenswood Works have given us great satisfaction. They do the work for which they were designed with comparatively little noise and run smoothly. They are well made and I am satisfied will be durable. We hesitated some time before giving this order, believing that our experience was not sufficient to give us what we desired, as our specifications were rigid and the requirements severe, but I have no reason to regret having placed the contract with you and I hope to be able to do business with you in the future. Yours very truly,

ALTON S. MILLER, Chief Engineer.

THEY RUN SMOOTH

G. C. KRUEGER DRYING COMPANY.

SHIP L. ISLAND SOUND, NEWARK, N. J., July 16, 1900.

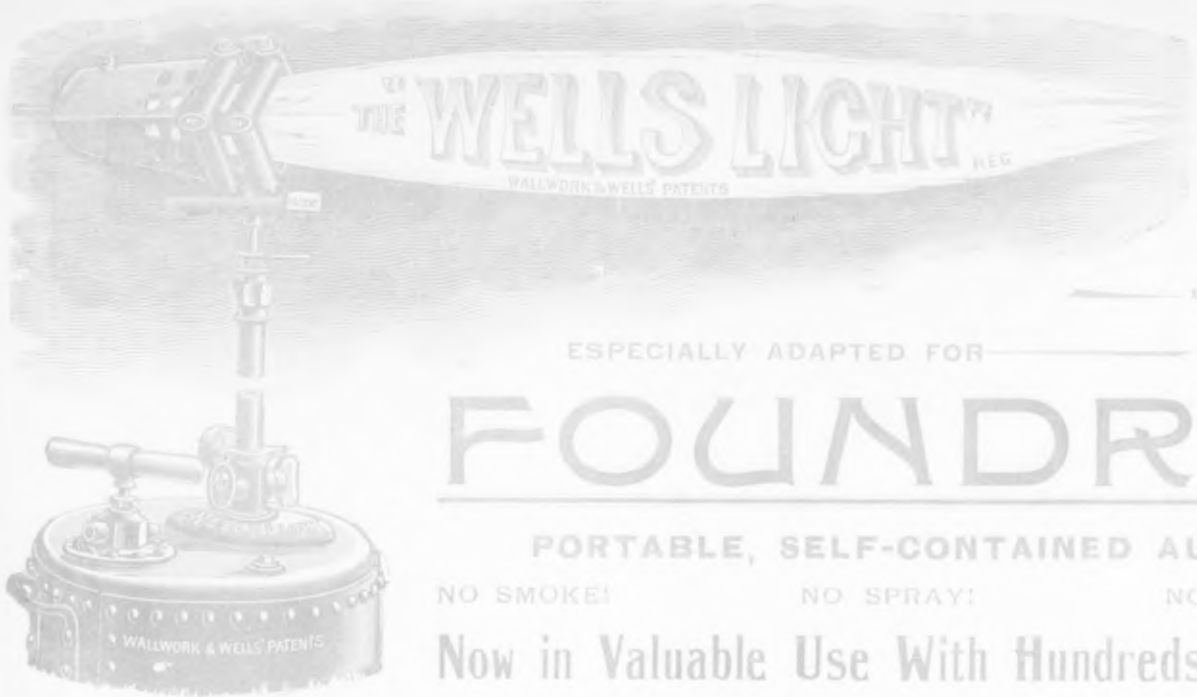
Messrs. J. B. & J. M. Cornell, 26th Street and 11th Avenue, New York.

Gentlemen:—After having 4 sizes of your Blowers (Pooley Pat.) from 72in. to 96in. in operation for several months we can recommend them to be superior in handling as much air as they are rated. One fact more in favor of these Blowers than others I have seen is the amount of power used either indirect or direct to operate them; as to speed running there is no question, for unless you stood within 10 ft. of Blowers you would not know it was running. We are now running a 96in. Blower to Revolving Hot Oxy of 800 h. without any cooling water going through bearings and runs perfect. With best wishes for your success in Blowers and assuring you that we will have nothing but Pooley Pat. Blowers in our works, we remain, Yours truly,

G. C. KRUEGER DRYING WORKS, Per C. Krueger, Mgr.

THEY SAVE POWER

J. B. & J. M. CORNELL, 26TH STREET AND 11TH AVENUE, NEW YORK CITY.



Over
15,000
in Use.

ALWAYS READY!

800 TO 2,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS-MEEHAN FOUNDRY CO. }
CHATTANOOGA, TENN., MAY 5, 1893. }

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, Jr., Sec'y. & Treas.

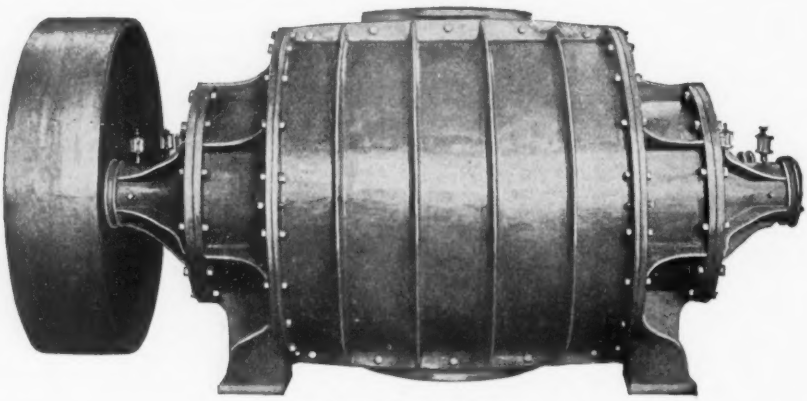
REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

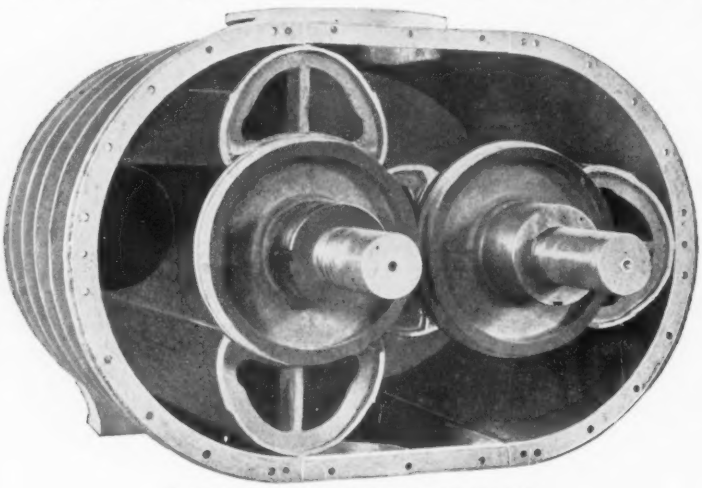
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

WOULDN'T YOU?

Wouldn't you give almost anything to be able to fix up a blemish in a casting occasionally in a way perfectly legitimate and satisfactory to the customer, especially if he is at the door waiting for it on the day you promised to deliver it?

Explanations about soft cores and bubbling dirty iron, don't satisfy your customer half as well as to be able to say "Their is your casting!" There was one small blemish that did not amount to a fault, and it was fixed up by a careful man with Smooth-On Castings making it perfect. A time saver is a money maker in the foundry, as well as any other business.

Smooth-On is not a universal cure for every fault in castings, but many are rejected and thrown away losing cost of cores, molding, melting and general expenses, that might have been saved with one little can of Smooth-On Castings, an iron cement that permanently repairs iron and steel castings.

A steel cylinder casting with a hundred small holes not as large as a human hair can be made perfectly tight, with a plastic coat of Smooth-On on the inside and eighty pounds of air pressure to force the Smooth-On into the pores of the metal. The seams and rivets of a leaky steam-boiler can be made tight in the same way.

Smooth-On Castings is the only preparation that permanently repairs defects in iron and steel castings. Do not accept imitations which are only fillers. The genuine Smooth-On Castings always bears this trade-mark. We also make Smooth-On Cements for Engineers, Steamfitters and Boilermakers. Each is adapted to its special line of work. In short, if you are troubled with leaks, either under high or low pressures, write us. We can stop them. We have a booklet telling about our preparations which we would like to give you if we had your address.

SMOOTH-ON
TRADE MARK

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

IRON CEMENTS A SPECIALTY.

547-549 COMMUNIPAW AVENUE. JERSEY CITY, N. J., U. S. A.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.

The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

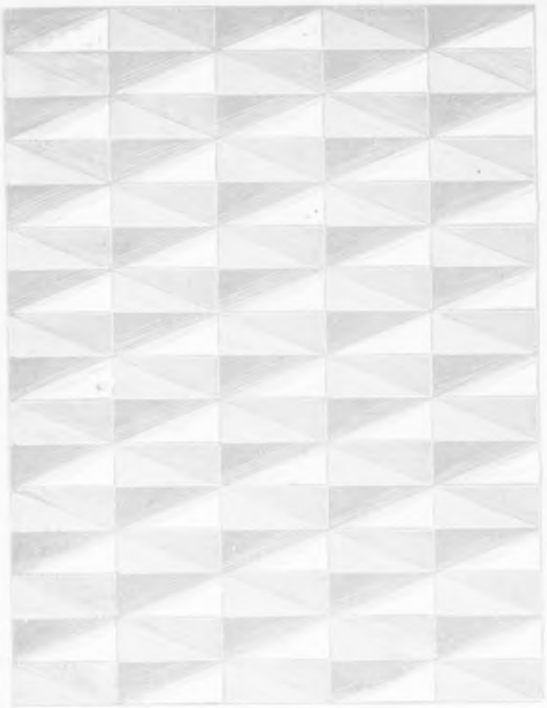
DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED. J. W. JACKMAN & CO., *Sole European Representatives, London, S. W. Eng.*



The above cut shows exact size of Diamonds.

Diamond Pattern Lumber,

—FOR—

DOOR SILLS, PLATFORMS, STEP PLATES, Etc.

This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "jointing" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 3 feet long by 6 inches wide, and ⅞ inch thick. Send for sample.

BROWN BROS. MFG. CO.

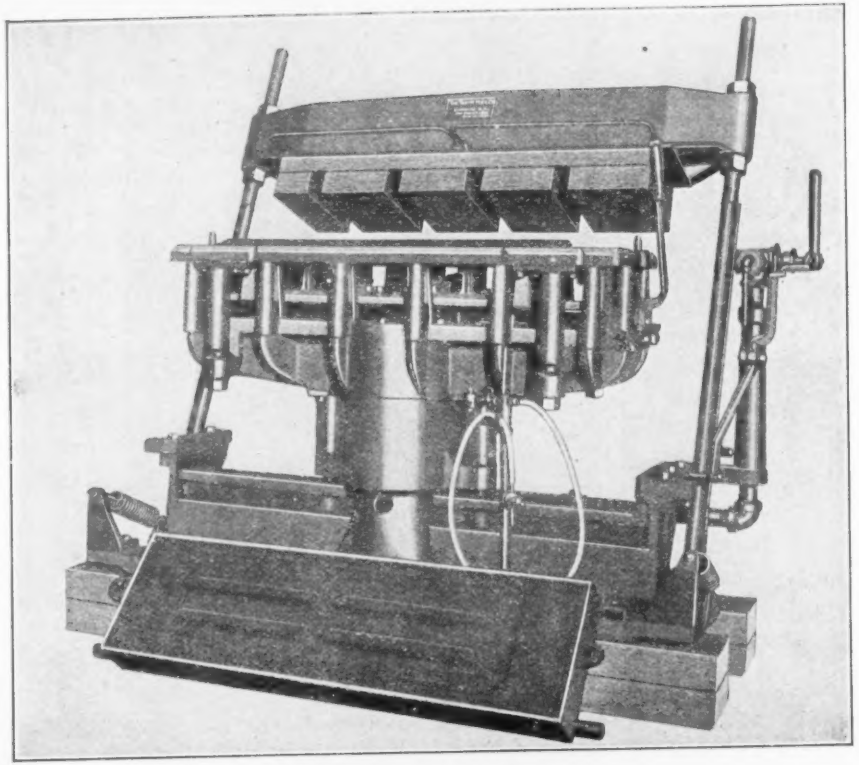
Cor. Clinton and Jackson Sts. Chicago.

PRISMATIC SIDEWALK LIGHT TILE.

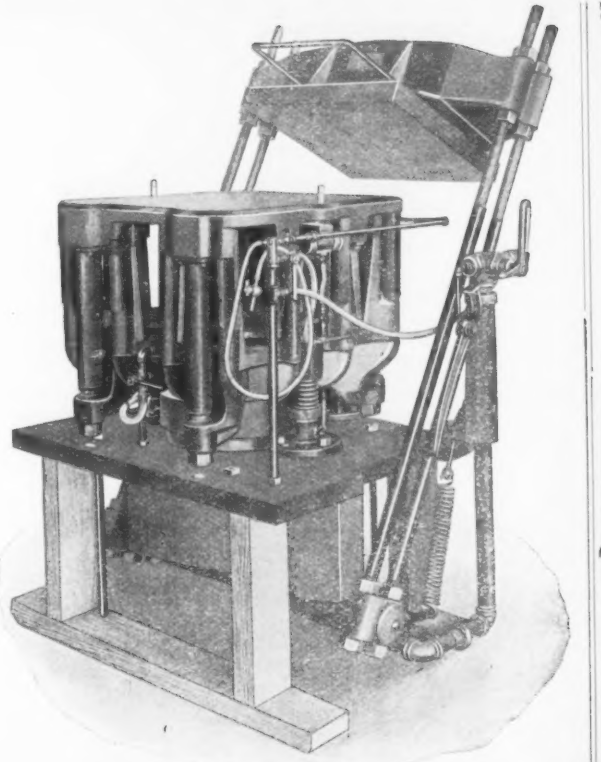
Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

BROWN BROS. MFG. CO.,

Cor. Jackson and Clinton Sts. CHICAGO.



12½x41 in. Split Pattern Machine.



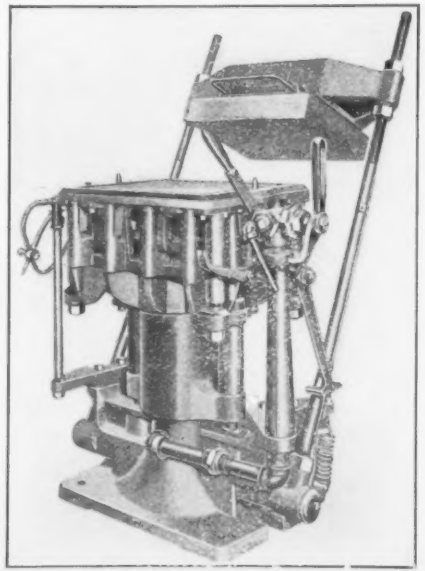
26x26 Vibrator Molding Machine for Flasks.

The Tabor Molding Machines

The Tabor Molding Machines

ARE MADE IN LARGER VARIETY OF DESIGN, SIZE, PATTERN DRAFT, ETC. THAN ANY OTHERS.

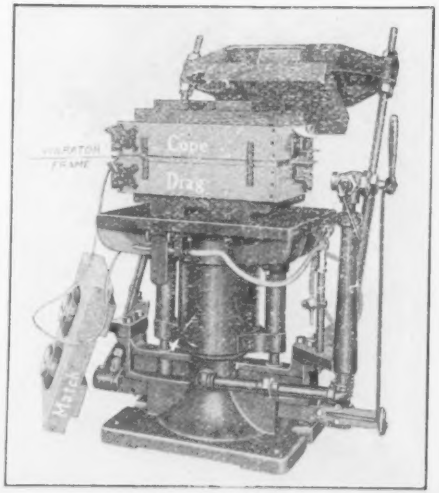
We build a Vibrator Frame Machine on which, in one shop, six or eight sizes of flasks of every dimension are used, and on fifteen of these machines over four hundred sets of every conceivable kind of pattern are in regular use and these patterns are no different from what they used before they installed machines. Patterns do not have to be built into this machine like store teeth. Give us a chance to make your foundry more of a money maker than it is.



14 x 16 in. Split Pattern Machine.

The Tabor Manufacturing Company,

ELIZABETH, N. J.



Vibrator Frame Machine.

Schuchardt & Schutte, Berlin, Germany.
James Hartley & Co., of Manchester, Ltd., Manchester, Eng.

OLIVER WOOD TRIMMERS

SAVE MONEY ON PATTERNS

OLIVER Wood Trimmers save money on patterns. We repeat this statement because there are yet a good many who have not learned by experience the truth of it. If you have not Oliver Wood Trimmers for the exclusive use of each patternmaker, you are missing a chance to save a large percentage of the cost of your patterns. Think of the amount of time to be saved by having a machine that will instantly trim a rough end of wood as smooth as glass, and perfectly accurate, at any desired angle. Think of the time wasted by not having this machine convenient for the use of each man. We have been putting Trimmers on the market for a good many years. If yours is one that was purchased some time ago, it will be interesting and profitable for you to investigate the improvements and new styles we have made recently. You had better write for our Oliver Wood Trimmer book.

AMERICAN MACHINERY CO.
GRAND RAPIDS, MICH.

TAKE THE RAMMING UP OF A LARGE COPE

THE MAYWOOD RAMMER.

and the bulk of the work is hard pounding, requiring muscle rather than brains. Take any large mold in either green or dry sand and the hardest part of the molders work is pounding sand, and hard pounding at that. To save the molders muscle and also to let him get over the job quicker, we have designed the

MAYWOOD RAMMER

It does both peining and butting off and does it rapidly and well. You should try one. Compressed air is a cheaper power than flesh and blood.

For castings which you make in considerable numbers you should have a

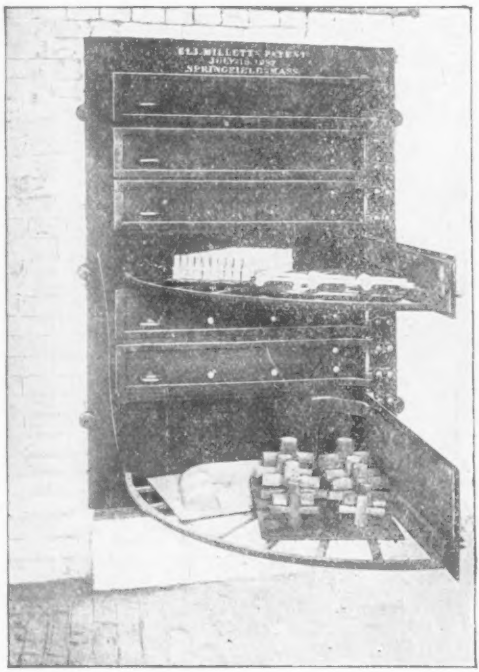
MAYWOOD MOLDING MACHINE

We build these to suit any kind of work. It will cost you nothing to find out what we can do for you. Send us a blue print or sample casting.

THE MAYWOOD MOLDING MACHINE.

Maywood Foundry and Machine Co.

MAYWOOD, ILLINOIS.



PERFECT CORES

are a blessing to any foundry. Without them there are delays, loss of work, loss of customers and loss of money. Every practical foundryman knows that many core ovens will either turn out half baked cores or burnt ones. This is because the oven is not built right.

With the **Millett Core Oven** there is no such trouble. It is built right and is acknowledged to be the only perfect Core Oven on the market. That this is true is shown by the fact that foundries come back after more **Millett Ovens** the minute they enlarge their plants.

Then again, the **Millett Oven** is rapid. It turns out perfect cores on short order. If you ever get in a hurry for a core you will wish you had a **Millett.**

Send today for a booklet describing it in detail.

Millett Core Oven Co.

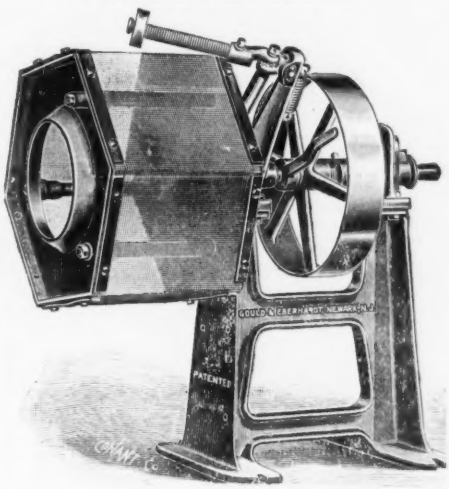
BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

BEGIN THE YEAR RIGHT

PRICES REDUCED.



Single End Belt Driven Machine.

by ordering one of our Eberhardt's patent Automatic Sand Sifters and Mixers.

It will pay for itself in less than a month.

The saving over the old method of riddling by hand is about 83⅓%.

Single end machine has a capacity of 60 tons per day (170 cubic feet per hour.)

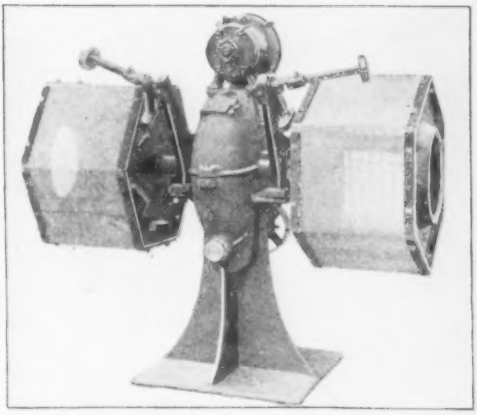
The machine both mixes and sifts sand at the same time.

Core and facing sand after being wet down is readily sifted.

Motor Driven Machines for shops having electric or compressed air motor power.

We also build ***Portable Motor Driven Machines,*** mounted on a truck or arranged for transporting to different parts of the foundry by travelling crane.

The most economical and inexpensive labor saving machine ever put on the market for the purpose.



Double End Motor Driven Machine.

Don't you need one or more of these machines in your foundry? All the up-to-date people have them.

MADE SINGLE OR DOUBLE END, BELT OR MOTOR DRIVEN.

Want to know more about them? Write for **"Like This."**

GOULD & EBERHARDT

NEWARK, N. J.

THE COST OF MOVING

material becomes almost nothing when the **Coburn Trolley Track** is employed.

The **Coburn** is low in price, simple in construction and easily put up in any shop without interfering with anything else.

There is no complicated machinery about the **Coburn,** nothing to get out of whack. Once you have it, it stays in working order without attention.

Then think of what it is to be able to reach any part of the shop, no matter how badly the gangways are blockaded.

The **Coburn** will bring your cores from the Core Room, metal from the Cupola and deliver molding sand right on the floors. It will carry your castings to the cleaning room, coke and iron to your cupola, in short move anything about a foundry.

Give us a chance to furnish you an estimate of what this will cost you.

Coburn Trolley Track Mfg. Co.,

HOLYOKE, MASS., U. S. A.

MECHANICAL
DRAFT
APPARATUS
B. F. STURTEVANT CO.
BOSTON, MASS.
NEW YORK PHILADELPHIA CHICAGO LONDON
141

Ask the Man

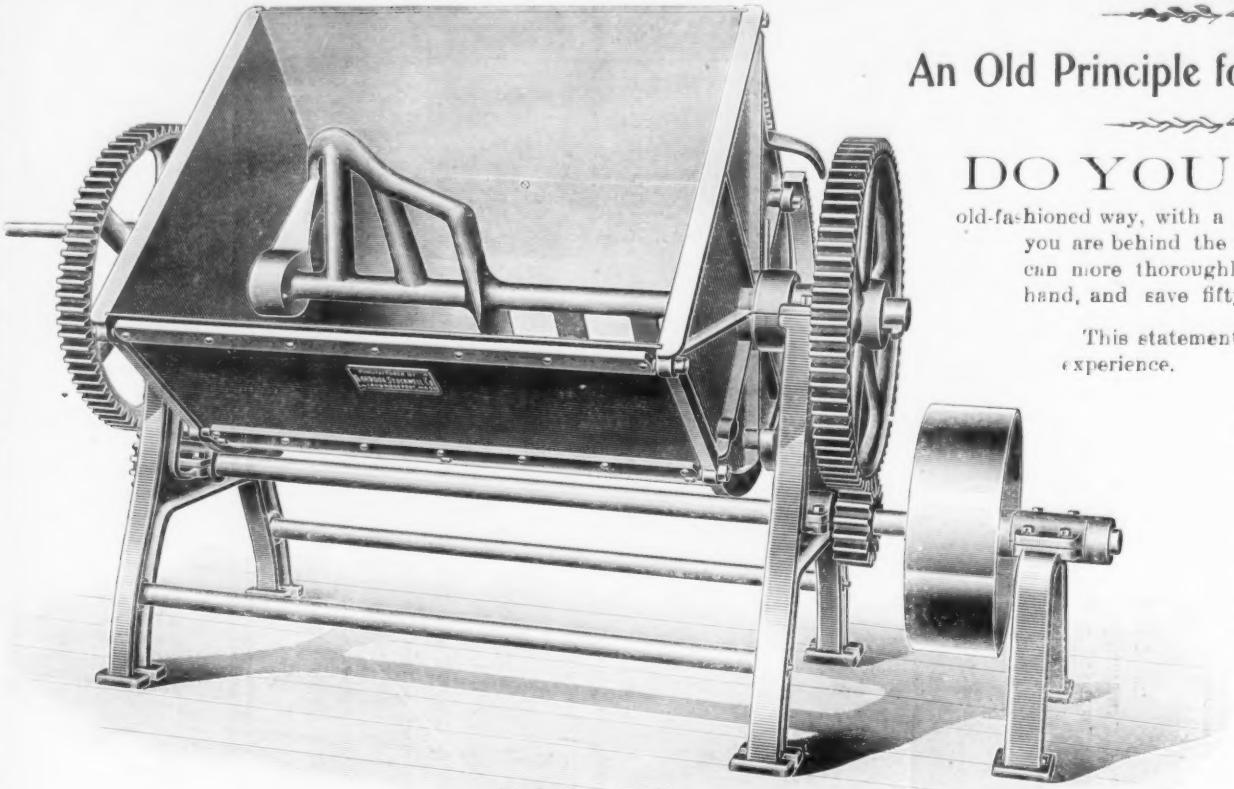
Who turns out better castings than you are doing and he will tell you that he watches his iron and buys same only after a careful inspection of its strength and softness. The **Cherry Valley** brand of Pig Iron contains that strength and softness which is so essential to a perfect foundry iron. It is made by the **Cherry Valley Furnace,** which makes nothing but foundry iron and nothing but the very best at that. For more than twenty years this furnace has set the standard in foundry irons. The ores it employs are all carefully inspected, the fuel it consumes is bought on specifications, in short every precaution is taken to insure a uniform product. Do you wonder that foundries having a reputation for superior castings use **Cherry Valley Iron?** You should do the same.

We give immediate attention to all requirements whether large or small. Order a car load of **Cherry Valley Iron** to-day for use in particular work.

The Cherry Valley Iron Co.

Murtland Building PITTSBURG, PA.

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

DO YOU mix your facing sand, core sand, fire clay, etc., in the old-fashioned way, with a laborer and a shovel? Then you are behind the times. With this mixer, you can more thoroughly mix it than is possible by hand, and save fifty per cent. of your labor.

This statement can be verified by actual experience.

The material is shovelled into the machine or fed in through a hopper, after riddling. The machine is then started, and in five minutes the mass is perfectly mixed. Turning a crank at the side cants the machine and empties the material either on the floor or into a receptacle provided.

Capacity, 250 lbs. every five minutes.

Pulley, 24 in. diam. x 6 in. face.

Floor Space, 7 ft. x 3 ft.

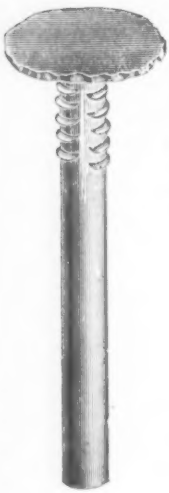
Speed of Pulley Shaft, 125 revolutions.

Weight, 1250 lbs.

For further particulars, write

BARBOUR-STOCKWELL CO., 205 BROADWAY, CAMBRIDGEPORT, Mass.

Better than You can do!

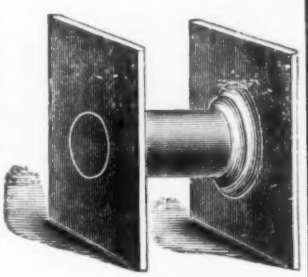


We make chaplets of all kinds better than you can do because we have special machinery and tools for doing this work, which you do not possess.

In making a specialty of turning out chaplets we not only produce perfect chaplets but we are enabled to sell them to you for a great deal less than it would cost you to turn out chaplets of an inferior quality.

Our Radiator Chaplets are used by all leading makers, in short, there is no manufacturer of castings which must be subjected to pressure, but who recognizes the superior quality of our chaplets.

If you are troubled with leaks around chaplets in your castings, let us supply you with something which will overcome this annoyance. If you make special castings you should have special chaplets. They will save your molders' time and make you greater profits on the job.



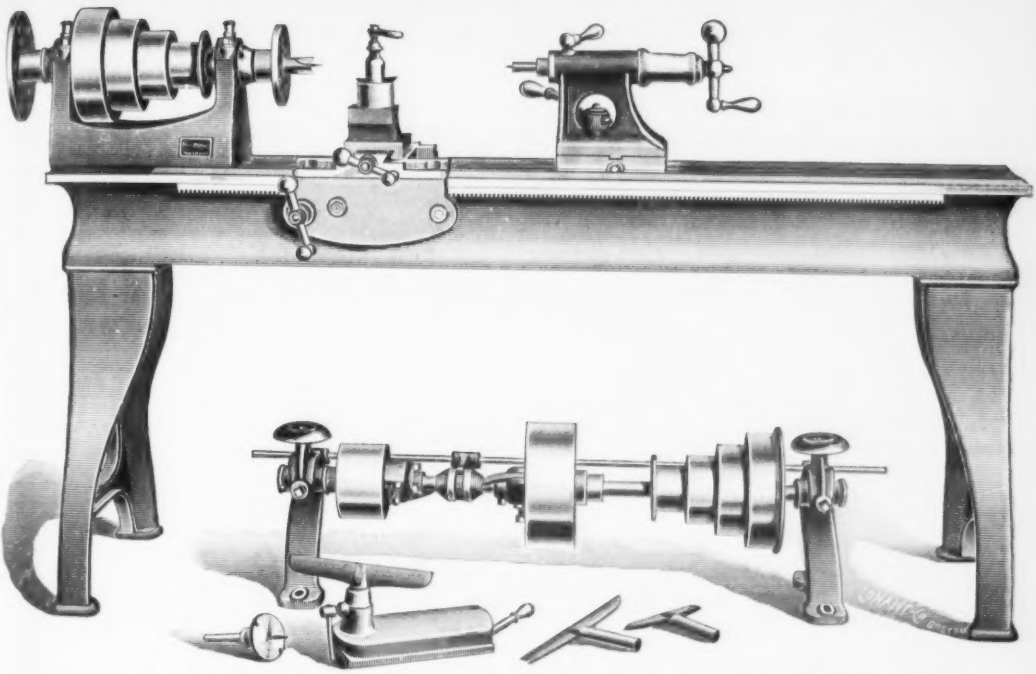
Tell us exactly what you need in the line of chaplets and we will make it for you. Better and cheaper than you can make it yourself, too.

We also manufacture Stove Trimmings, Stove Scrapers, Stove Rods and Stove Bolts. For this class of goods you should come to headquarters. We guarantee our goods to be first-class and will make prompt shipments. You should have our catalogue giving prices. It is sent free upon request.

The Fanner Manufacturing Co.,

BROOKSIDE PARK,

CLEVELAND, OHIO, U. S. A.



16-INCH HOLLOW SPINDLE PATTERNMAKERS' LATHE, WITH CARRIAGE SLIDE REST.

Price, $157.00 (including Tripod Rest).

YOUR PATTERN SHOP

demands attention, just as well as your foundry. Without suitable tools for your patternmakers you are handicapped at the outset. We have made a specialty of Patternmakers' Lathes for the past sixteen years and have supplied the majority of the leading shops at home besides many abroad. We make regular Patternmakers' Lathes from 10-in. to 84-in. swing, and are prepared to furnish specifications for anything in this line which may be called for, of any size or description.

Drop us a postal card for our catalogue and state what you need. We can furnish it at reasonable prices.

FAY & SCOTT, DEXTER, MAINE, U. S. A.

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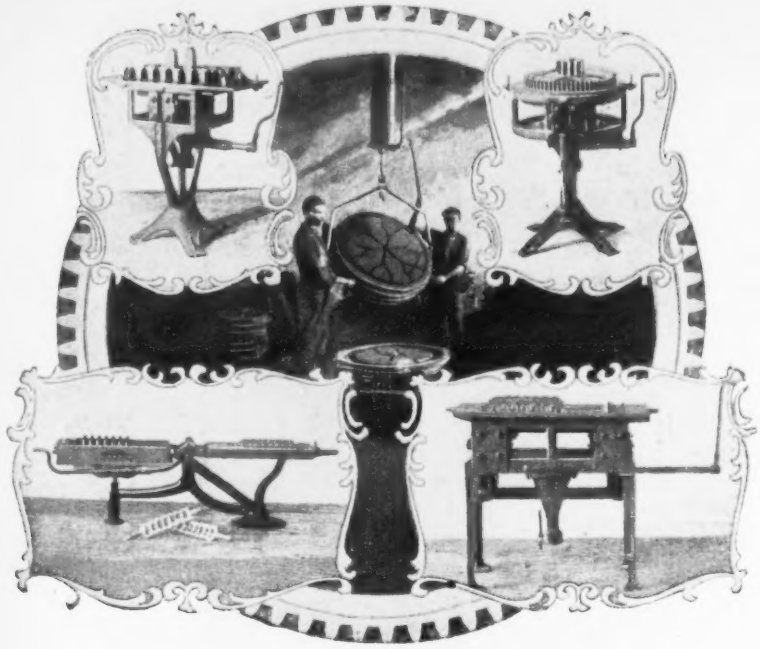

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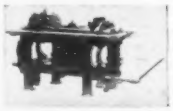

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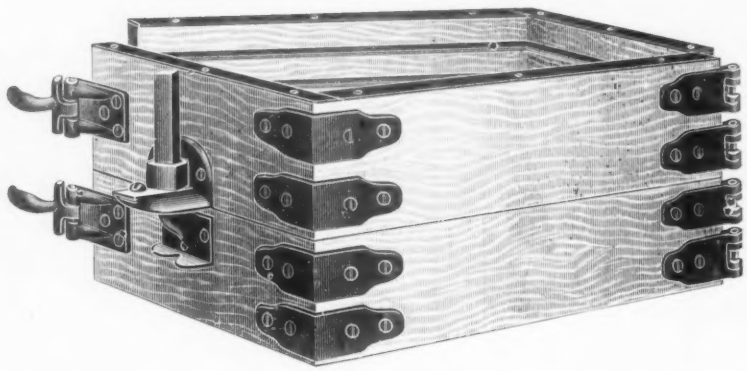

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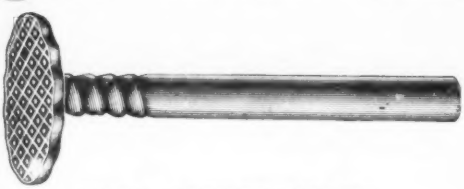

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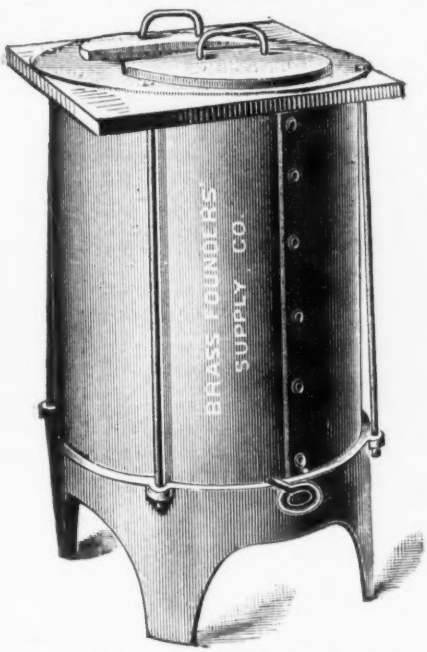

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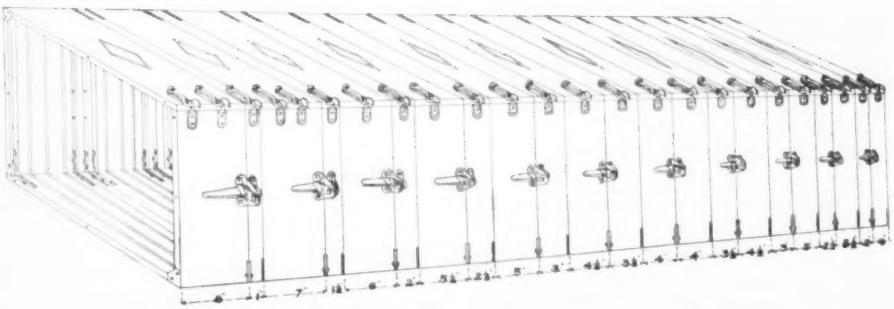

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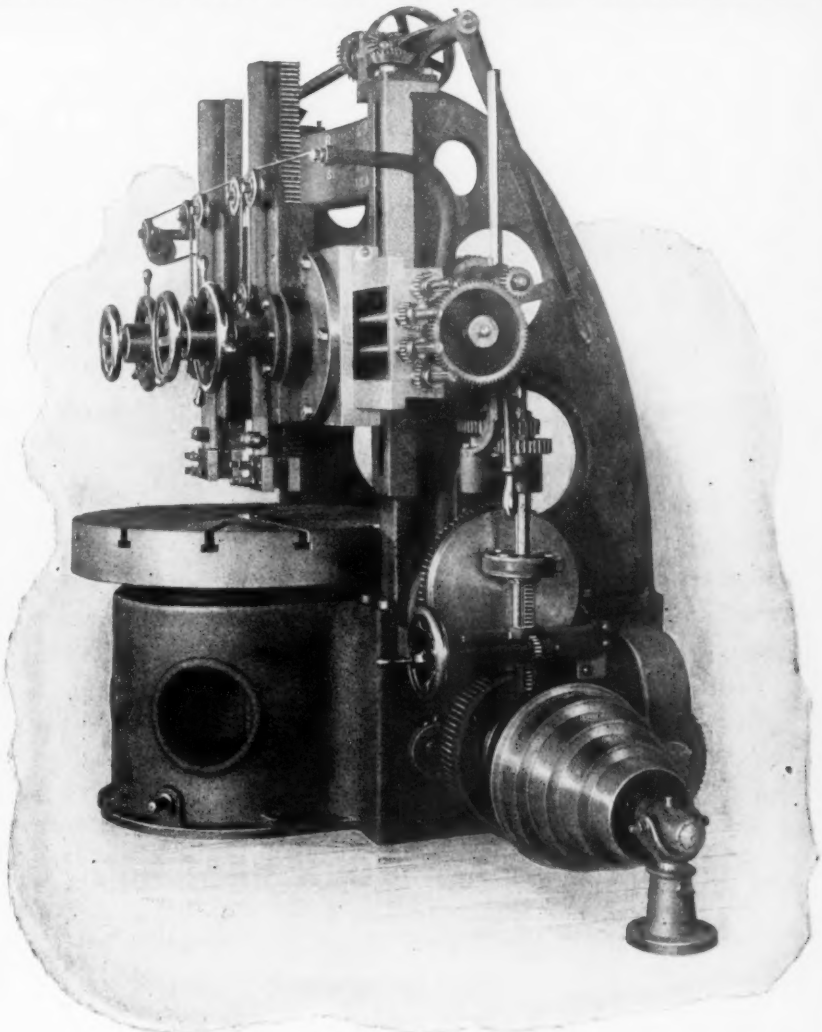

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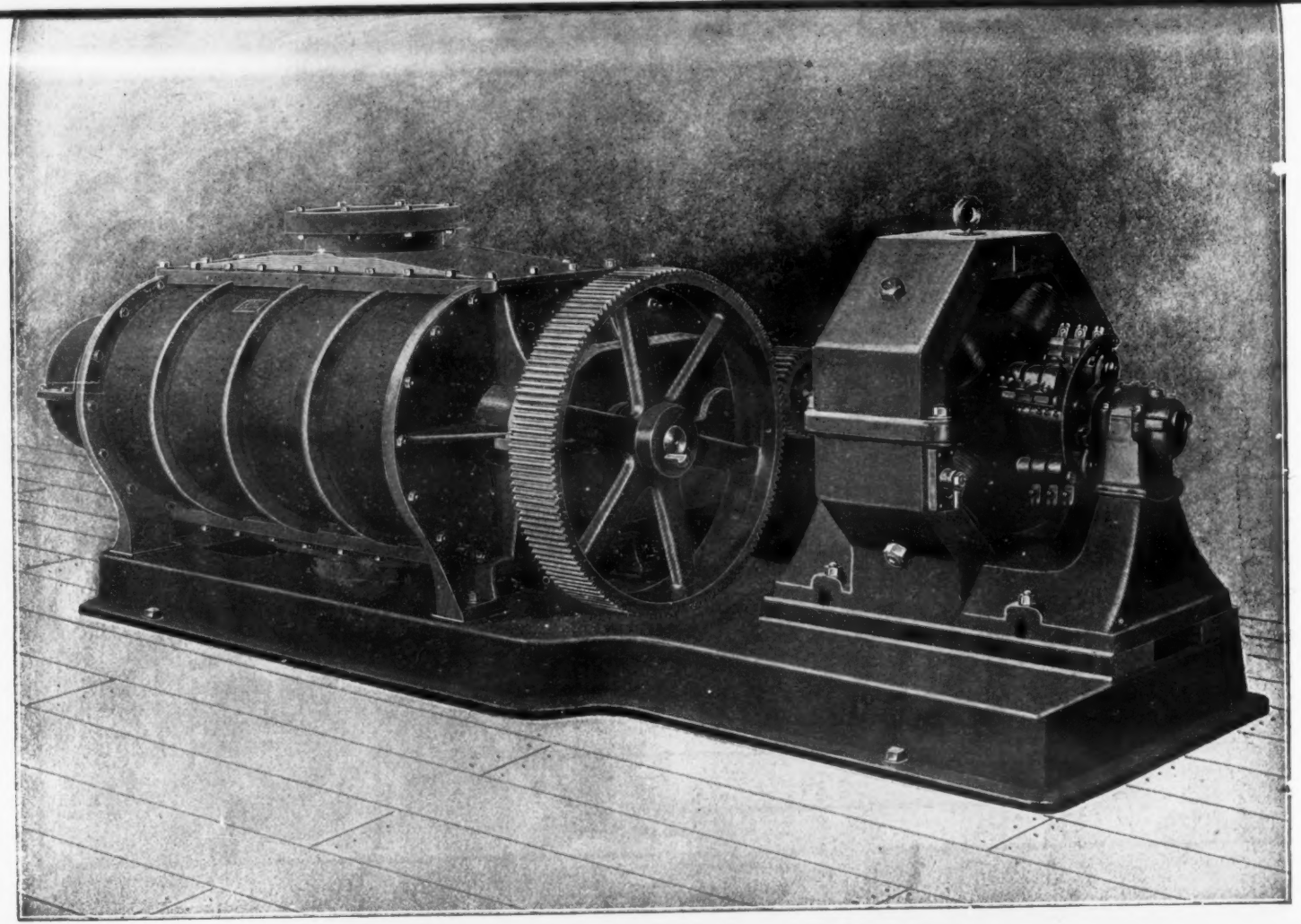

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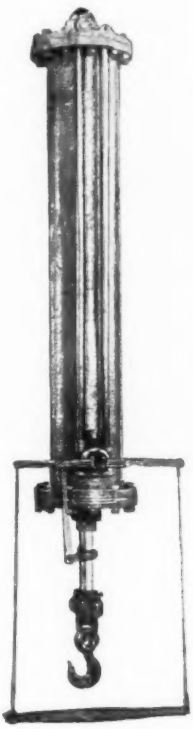

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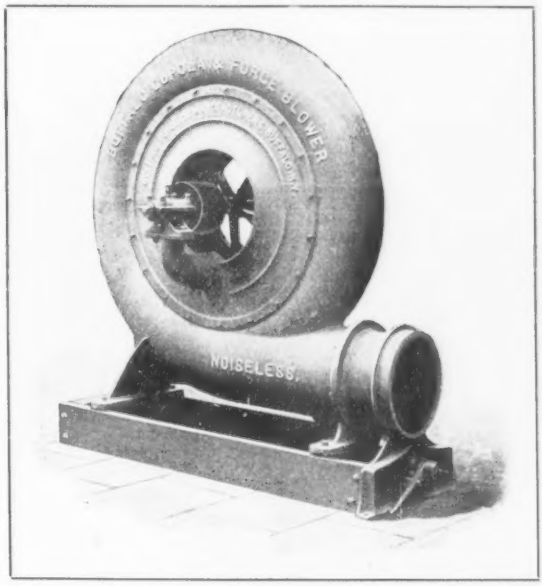

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Alphabetical Index to Advertisers.

Adams Co., The 60
Addy & Co., Matthew 60
Akron Fillet Machine Co 66
American Blower Co 15
American Bridge Co 11
American Glutrose Works 46
American Machinery Co 28
Angell & Dobson 67
Ajax Metal Co 58

Baush Machine Tool Co 45
Barbour-Stockwell Co 35
Barnard & Leas Mfg. Co 56
Barnett Foundry Co 65
Bessemer Coke Co 16
Brass Founders' Supply Co 41
Bridgeport Crucible Co 13
Brim, A. W 67
Brown Bros. Mfg. Co 25
Buffalo Forge Co 51

Carborundum Co 17
Case Manufacturing Co 65
Cherry Valley Iron Co 34
Chicago Pneumatic Tool Co 10
Chicago Fire Brick Co 67
Chisholm & Moore Mfg. Co 64
Church, S. R. ..... 43 and 60
Clark Cast Steel Cement Co 38
Clayton Air Compressor Co 56
Cleveland Facing Mill Co 9
Clinton Iron & Steel Co 55
Coburn Trolley Track Co 32
Connersville Blower Co ..... Back Cover
Cornell, J. B. & J. M ..... 19, 20 and 65
Cowles Electric Smelting and Aluminum Co. Inside Back Cover

Dayton Coal & Iron Co 60
Decamp Bros. & Yule 60
Diamond Clamp & Flask Co 44
Diamond Machine Co 56
Dings Electro-Magnetic Separator Co 55
Dixon Crucible Co., Joseph 8
Domhoff & Joyce Co 60

Fanner Mfg. Co 36
Fox Machine Co 64

Garden City Sand Co 69
Gobeille Pattern Co 57
Goff, Horner & Co 68

Fay & Scott 37

Green & Co., C. H 40
Goodrich & Co., F. A 60
Gould & Eberhardt 31

Hanna & Co., M. A 60
Heyl & Patterson 58
Hillman & Son, J. H 60
Holmes & Co., F. B 43
Hunt Co., C. W 62

International Correspondence Schools 61

Jacobson, A. M 59

Keep, W. J 63
Knight & Son, H. W 57

Mack, Thomas A. & Co 60
Maurer & Son, Henry 43
Maywood Foundry & Machine Co 29
McCormick Co., J. S 60
McCullough-Dalzell Co 49
Mt. Carbon Co 66
Millett Core Oven Co 30
Minerva Pig Iron Co 61
Mohr, J. J 61

Nash & Co., George 57
Northern Engineering Works ..... 53 and 59

Obermayer Co., The S. Front Cover and Pages 1, 2, 3 and 4

Paxson Co., J. W ..... 5 and 6
Peirson & Co., C. L 61
Philadelphia Pneumatic Tool Co 64
Pickands, Brown & Co 61
Pilling & Crane 61
Presbrey Fire Brick Co 43
Pridmore, Henry E 39

Ridgway & Son Co., Craig 18
Rogers, Brown & Co ..... 61 and 70
Roots Co., P. H. & F. M ..... 47 and 48

Scioto Star Fire Brick Works 43
Sellers & Co., Wm 14
Smooth-On Manufacturing Co 23
Staten Island Clay Co 43
Stewart, W. H 66
Stevenson, Field & Co 61
Stover Manufacturing Co 63
Stow Manufacturing Co 59
Sturtevant Co., B. F 33
Superior Charcoal Iron Co 55
Swarts Metal Refining Co 68
Syracuse Malleable Iron Co 24

Tabor Manufacturing Co ..... 26 and 27

Vrooman, H. S 43

Washington Coal & Coke Co 12
Wells Light Manufacturing Co 21
Whitehead Bros. Co 7
Whiting Foundry Equipment Co 50
Wilbraham Baker Blower Co 22

CONTENTS.

Our First Century 139
Trade Outlook 139
Wages of British Molders 140
The Westinghouse Machine Co. Illustrated 141
Mixing Iron by Analysis 157
Answer to D. H. R. Illustrated 162
Casting a Double-Thread Worm. L. C. Jewett. Illustrated 163
Molding a Grindstone Trough. Geo. Buchanan. Illustrated 164
Scabs and Buckles. Edward B. Gilmour 165
What Caused It? Illustrated 166
Special Cupola Blast Apparatus. A. W. B. Illustrated 167
Magnetic Separators. Illustrated 168
Pattern Work that Helps the Molder. John M. Richardson 169
Electric Traveling Cranes. A. D. Williams 171
Strike Closes a Chicago Factory 175
Organized Labor 176
Notes on Malleable Castings 177
Aluminum Bronzes 178
Among the Foundries 180
Fires 182
Personal 183
Notes from Various Sources 183
Deaths 184
Printed Matter 185
A Greenhorn's Experience 185
H. W. Hoyt. Illustrated 186

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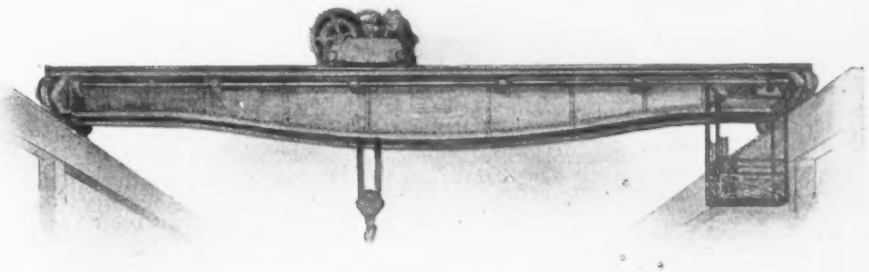
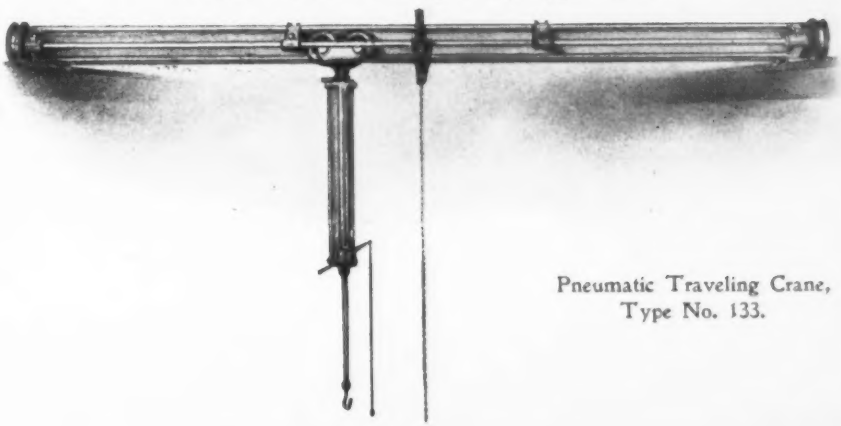


3 Motor Electric Traveling Crane, Type No. 105.



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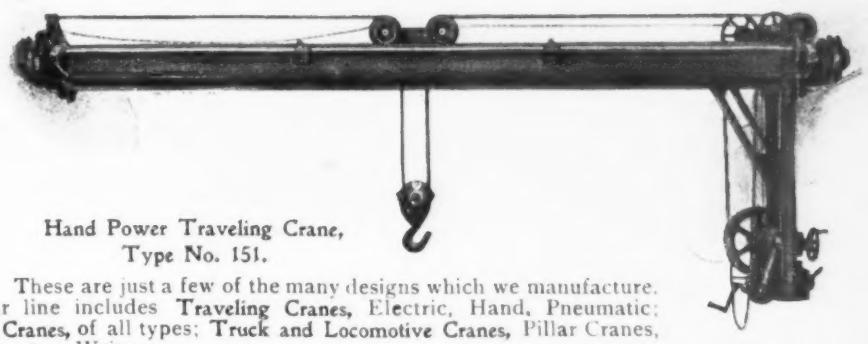

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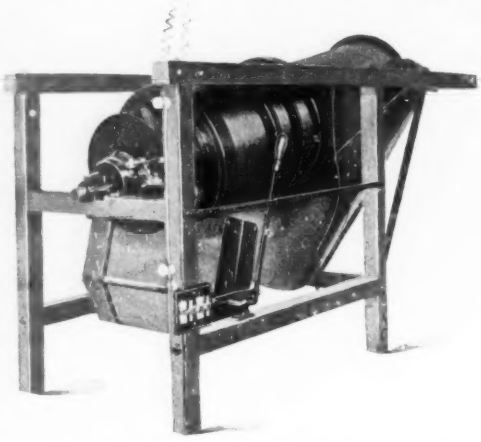

Save Your Iron

Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months.

EDWARD H. SLEIGHT, Prest. & Treas. HENRY H. LAGE, Secretary.

MOLINE PUMP COMPANY.

MOLINE, Ill., Sept. 17th, 1900.

Barnard & Leas Mfg. Co., Moline, Ill.

Gentlemen:—In accordance with our contract, that in case you could show on test of your Magnetic Separator, that it would net us fully 25% each year on the investment price of $300, that we would order one, we hereby enclose order for one Magnetic Separator and have to report as follows as to result of test:

We saved up the waste from our foundry and cupola for five heats (we melting every other day or three times a week and averaging some 5,000 lbs. of iron each heat.) This waste saved from the five heats weighed 8350 lbs., and on running it through your machine it separated and saved 1201 lbs. of iron.

On this showing we calculate the machine ought to net us after deducting all expenses of operating same, at least 35% each year on the cost price of $300. We consider this a strong test of the machine, as we had our cupola and other waste well picked over by hand before putting it aside for the trial test, and furthermore before the test was made we fully believed that our waste of iron was so small that it would not warrant us to buy one of your machines at any price.

Very truly yours, MOLINE PUMP COMPANY,
E. H. SLEIGHT, Prest. & Treas.

Give this machine a trial. The saving will surprise you. Write for prices and discounts.

Barnard & Leas Mfg. Co., *Mill Builders and Mill Furnishers, MOLINE, ILL.*

No. 7½ GRINDER.

This Grinder

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

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For removing Scale from Iron and Steel Plates, Bars, Forgings, etc., also Cleaning Iron, Steel and Brass Castings

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It will make it much easier for your customers to order repairs. It will make it much handier for your molders and patternmakers to find anything they want. It will avoid mistakes. In short, marking your patterns properly will be a financial gain to you.

We make pattern letters and numbers in all styles and will be glad to send you our catalogue giving full description and prices.

Then we furnish steel stamps and alphabets. For any of these goods you should come to headquarters. ***Send for Souvenir Stick Pin mailed free to any foundryman.***

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for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

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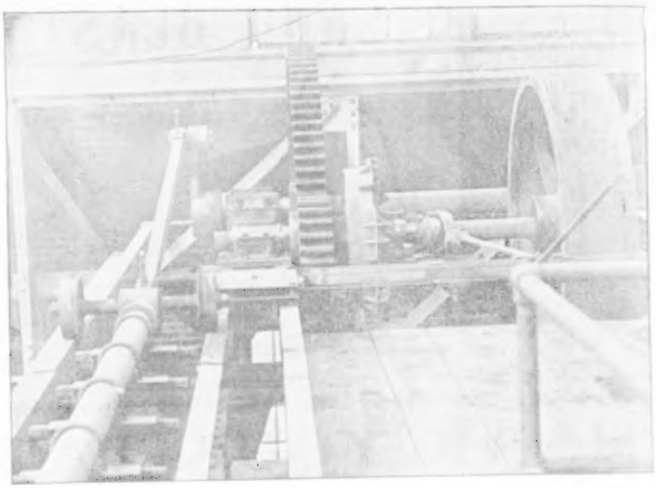
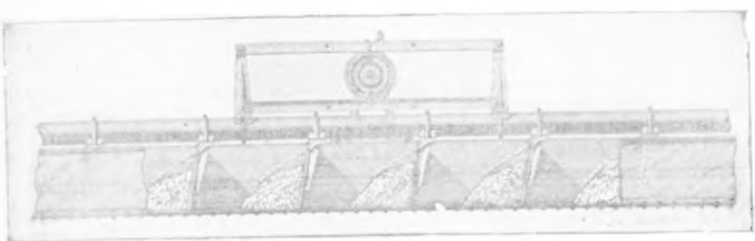
SLOW SPEED, PERFECT DISCHARGE ELEVATORS.





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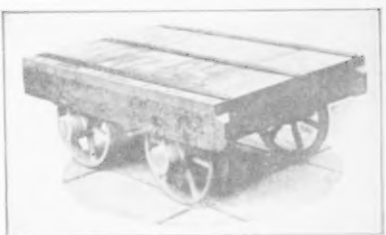

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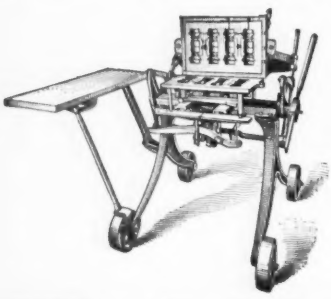

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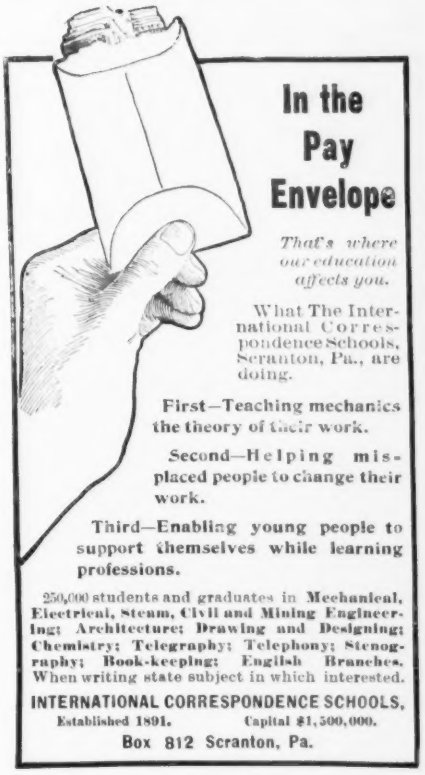

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contains the names and addresses of all concerns in the United States who melt Pig Iron.

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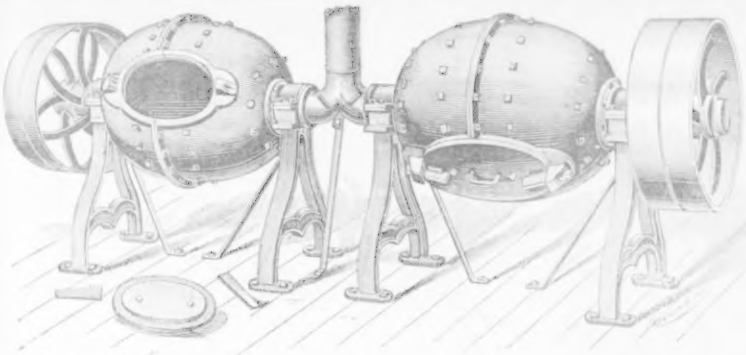

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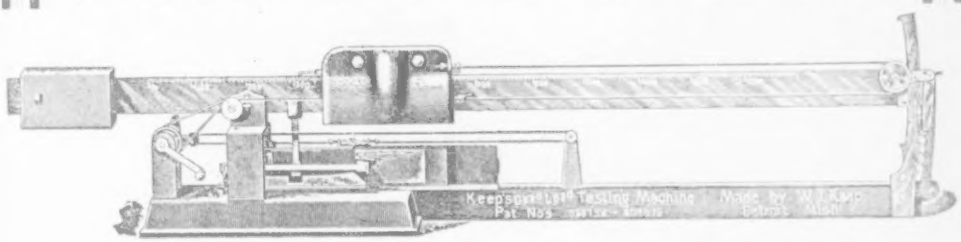

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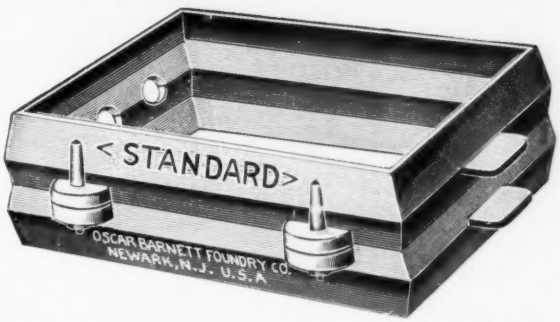

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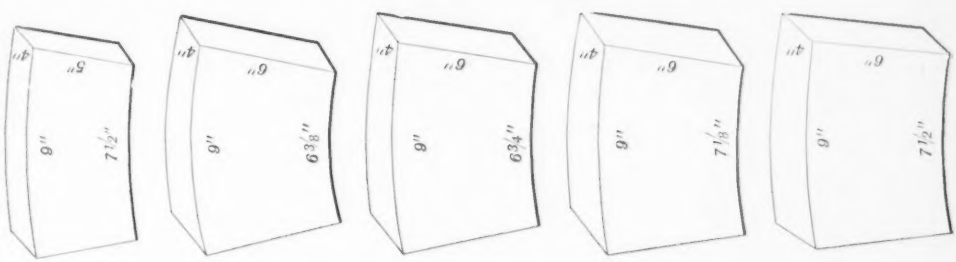
TO MAKE A TEST OF CUPOLA BLOCKS WOULD BE THE PRESENT



Why not learn whether you are wasting or saving money in the use of the brand you are now using. Let us furnish you a trial lot of **Dome Blocks.** We know we can save you money in first cost and furnish a Special Block, the very best obtainable. ***We are not guessing, we know it.*** **Our Molding Sand, Fire Clay, Loam, etc.,** are all first class. Can't we send you samples. :: :: :: ::

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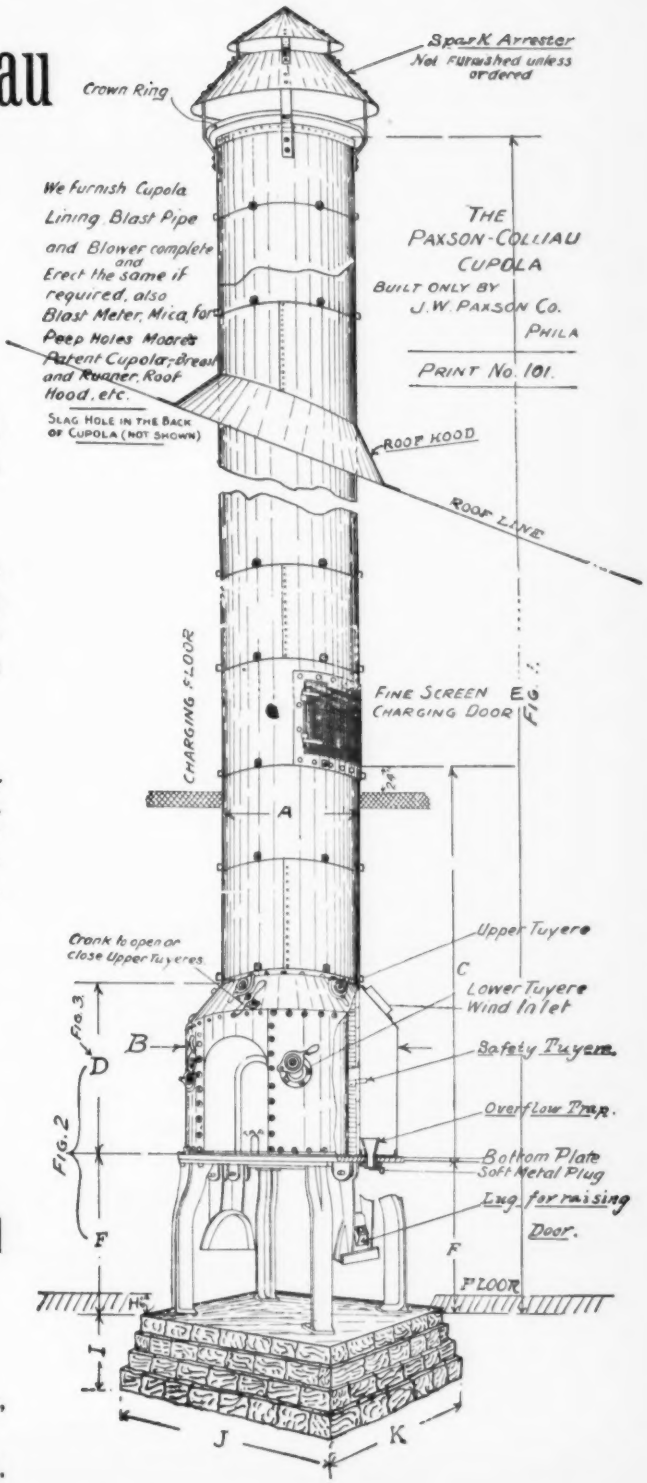

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WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.

Dixon's Crucibles

Run 50 to 60 Heats

HOW IT IS DONE

Cor. Grand and Victoria Aves.,
PUEBLO, COLO., Nov. 14, 1900.

Joseph Dixon Crucible Co.,
Jersey City, N. J.:

GENTLEMEN—I received your letter of the 10th inst. In reply to it will explain how I get from 50 to 60 heats out of your crucibles.

I first am very careful in annealing the crucibles, and and am very careful with good tongs not to squeeze them, and after pouring I take my skimmer and scrape all the dross off the inside of the crucible. With good care, and handling with care, I get these good results. I have tried other makes of crucibles but could not get as good results as with Dixon's.

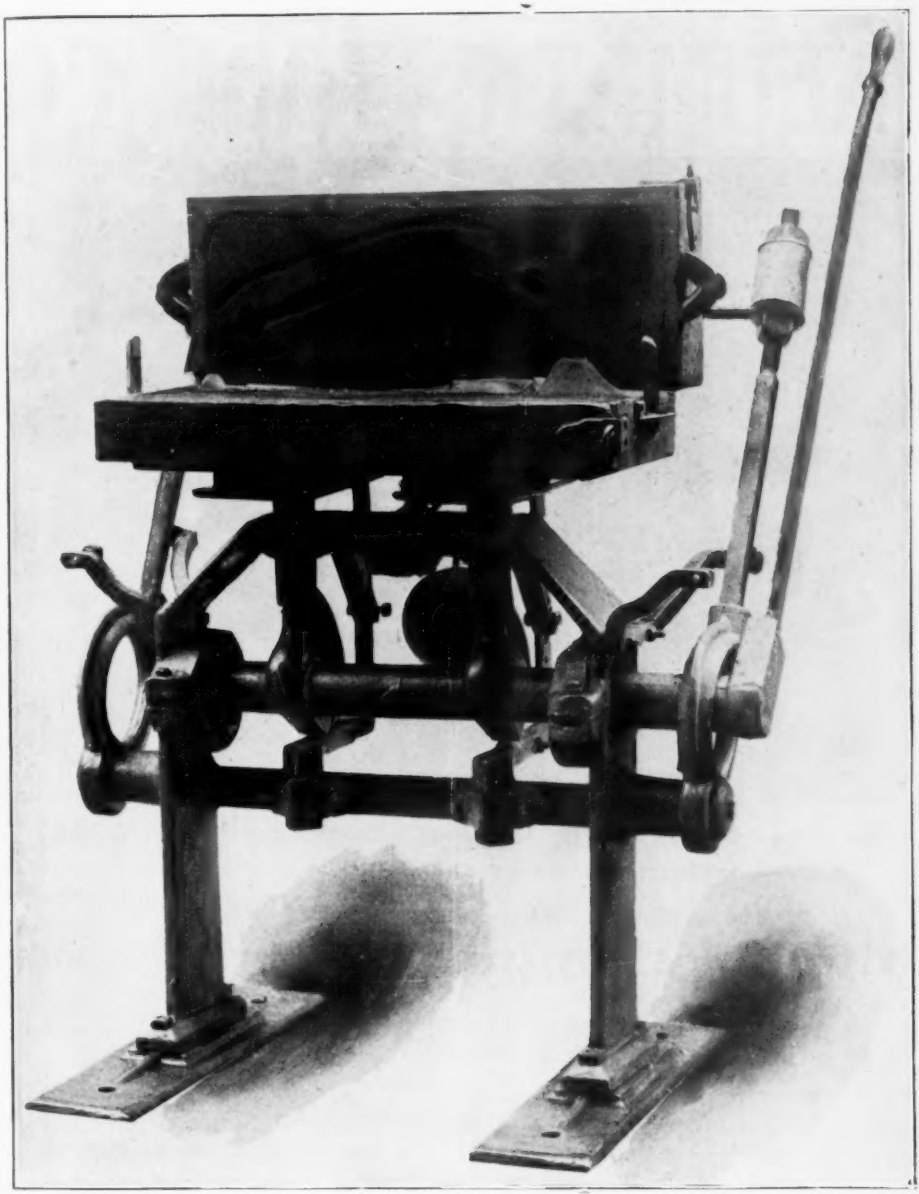
Yours very truly,

PUEBLO BRASS AND IRON FOUNDRY,
GEORGE J. ORTNER, Proprietor

Joseph Dixon Crucible Co.

JERSEY CITY ⌀ ⌀ NEW JERSEY

The Wachalec Molding Machine



The most efficient Molding Machine in the field to-day. Three hundred are already in use. For sale by :: :: :: ::

The Cleveland Facing Mill Co., CLEVELAND, OHIO.

MANUFACTURERS OF

FOUNDRY FACINGS AND FOUNDRY SUPPLIES.

CHICAGO PNEUMATIC TOOL CO.

Pneumatic Tools in designs and sizes for **Foundry Work.**
Our Customers say: "They go beyond guarantee."

One man does the work of four with our :: :: :: :: ::

Chipping Hammers

For drilling, reaming and tapping use our :: :: :: ::

AIR DRILLS . . .

They are especially valuable on heavy work not readily put under your drill press, and drill and ream up to 3 inches in diameter in iron and steel. :: :: :: :: :: ::

Air Compressors and Hoists

We send our tools on trial subject to approval. :: ::

New York Offices:
95 LIBERTY ST.,
NEW YORK.

General Offices:
MONADNOCK BLDG.,
CHICAGO.

AMERICAN BRIDGE COMPANY

DESIGNERS AND BUILDERS OF

Steel Bridges

Steel Buildings

AND ALL CLASSES OF

METALLIC STRUCTURES

GENERAL OFFICES:

No. 100 BROADWAY, NEW YORK CITY

BRANCH OFFICES AND WORKS:

Albany, N. Y.	*Canton, O.*	*Lafayette, Ind.*	*Seattle, Wash.*
Athens, Pa.	*Cleveland, O.*	*Milwaukee, Wis.*	*San Francisco, Cal.*
Boston, Mass.	*Denver, Colo.*	*Minneapolis, Minn.*	*Salt Lake City, Utah.*
Buffalo, N. Y.	*Duluth, Minn.*	*New Orleans, La.*	*Sidney, N. S. W.*
Baltimore, Md.	*East Berlin, Conn.*	*Pencoyd, Pa.*	*Trenton, N. J.*
Butte, Mont.	*Elmira, N. Y.*	*Philadelphia, Pa.*	*Wilmington, Del.*
Columbus, O.	*Groton, N. Y.*	*Pittsburg, Pa.*	*Youngstown, O.*
Chicago, Ill.	*Horseheads, N. Y.*	*Rochester, N. Y.*	*London, Eng.*

M. M. COCHRAN, PRES.
W. HARRY BROWN, V.-PRES.

JNO H. WURTZ, SECY.-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

William Sellers & Co., Incorp.

PHILADELPHIA, PA.

MODERN FOUNDRY MACHINERY

SAND MIXER

Not an Experiment

PRACTICAL
ECONOMICAL
EXPEDITIOUS

NOTE. — In order to clearly explain the **Modus Operandi** of this scientific and practical method of **mixing Molding Sand, Facing Sand** and **Core Sand,** we have issued a small pamphlet which will be sent on application.

Among late Purchasers are:

American Radiator Co., Buffalo, N. Y.
American Radiator Co., Titusville, Pa.
National Malleable Castings Co., Indianapolis, Ind.
National Malleable Castings Co., Cleveland, Ohio.
Fischer Foundry & Machine Co., Pittsburg, Pa
R. Hoe & Co., New York
U. S. Arsenal, Rock Island, Ill.
Michigan Malleable Iron Co., Detroit, Mich.
New York Air Brake Co , Watertown, N. Y.
Norfolk & Western R. R., Roanoke, Va.
And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence Is Solicited.

"THE WELLS LIGHT" REG

WALLWORK & WELLS' PATENTS

Over 16,000 in Use.

ALWAYS READY!

800 TO 4,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to all Railroads and Contractors.

ROSS-MEEHAN FOUNDRY CO. }
CHATTANOOGA, TENN., May 5, 1896. }

The Wells Light M'f'g. Co, Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y, & Treas.

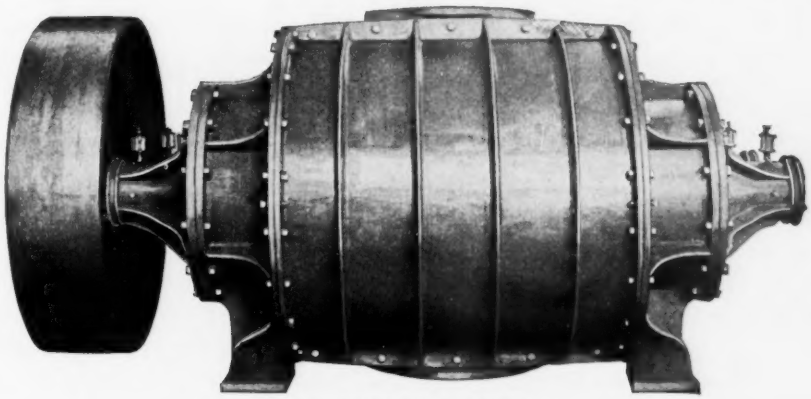
REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

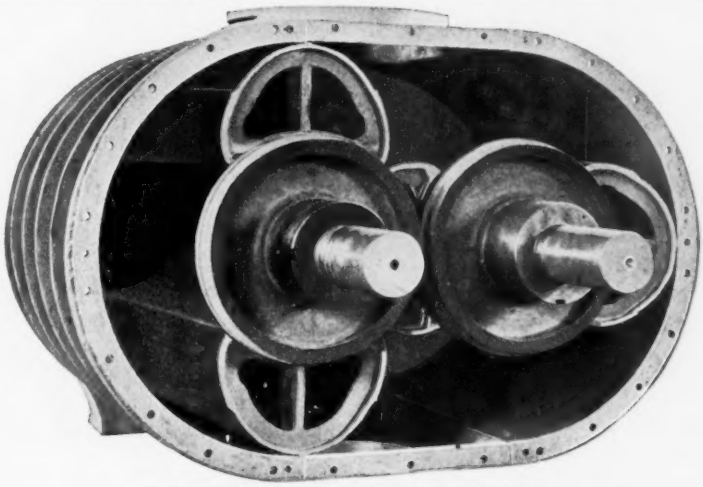
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

EVERY FOUNDRY MAKES SOME BAD CASTINGS

No matter how competent molders and coremakers a foundry has, there is hardly a day passes by, but that it produces some castings having more or less defects.

Some of these are small, very small, hardly noticeable and yet they condemn the castings.

Who will accept a casting that leaks under pressure? Who will not kick if there is a little sandhole somewhere in its surface?

Such castings have practically all the strength they would have if perfectly solid. In short the blemish is in reality but skin-deep.

"Too bad they can't be saved," most foundrymen will say.

And here is where we say: "They can be saved," and what is more nobody will know but what they were perfect in the first place.

One of these small cans contains enough material to remedy a dozen ordinary defects in castings.

SMOOTH-ON CASTINGS is its name and upon application it becomes for all purposes part of the casting itself.

Please do not confound **SMOOTH-ON CASTINGS** with the many cheap iron fillers on the market which only cause continued trouble. The Trade-Mark for our product is the hyphenated word On each can is a fac-simile of the signature Vreeland Tompkins. Where you find them you may rest assured of having the only genuine preparation which permanently repairs defects in castings.

SMOOTH-ON
TRADE MARK

Send for a small can and see how handy it is. You will not want to be without it afterwards.

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

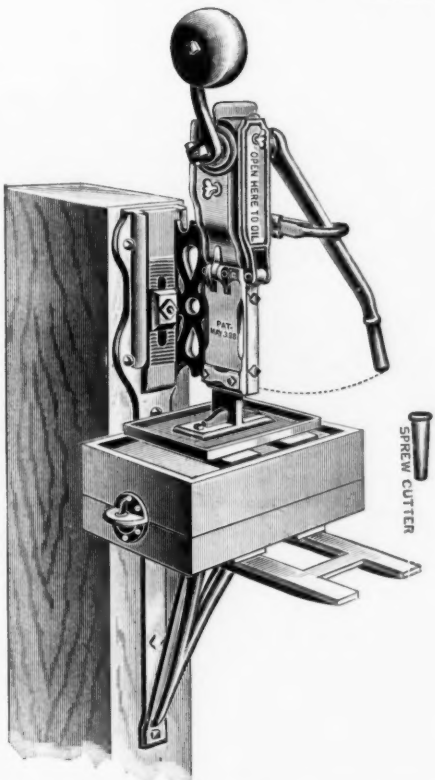
IRON CEMENTS A SPECIALTY.

547-549 COMMUNIPAW AVENUE JERSEY CITY, N. J., U. S. A.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

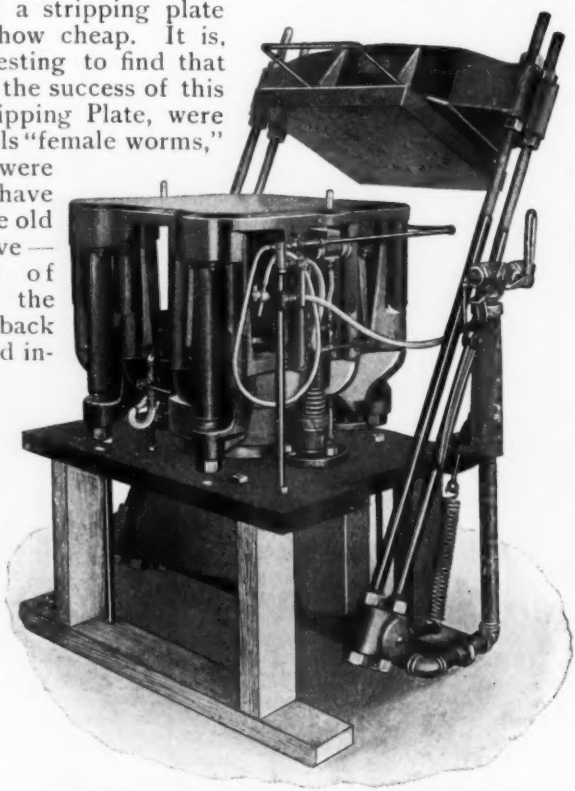
J. W. JACKMAN & CO.,
Sole European Representatives, London, S. W. Eng.

A Bit of Molding Machine History.

The first U. S. Patent for any kind of a Molding Machine was issued early in 1852 to a man named Satterlee, and it was quite a machine—seems to have been in appearance about half way between an eight day clock and a cider press—had "wheels"—of odd kinds, gear, sheave and sprocket, had pitman, levers, pawls, counterweights, chains and toggles—more gear than Kipling put into McAndrews Hymn.

All this mechanical uneasiness was to accomplish what the inventor called "the said work of sifting, filling and pressing."

Thus he omitted from the functions of a machine like a perfecting press and costing almost as much, the drawing of the patterns, the ONLY thing that some foundrymen are today buying $50 machines to do, on each of which they spend upwards of $1,000 for stripping plates and patterns. Satterlee was evidently ahead of his age in the U. S., for in England the very first idea of a molding machine, patented by one Maullin in 1800, was in effect nothing but a Stripping Plate—like some of our machines today—the $50 for machine, $1,000 for patterns kind. Maullin's machine molded screws (gimlet pointed too!), but even he in 1800 would probably have known better than to try to mold a lock case or a flat bevel gear with a stripping plate rig, no matter how cheap. It is, moreover, interesting to find that contributing to the success of this George 3rd Stripping Plate, were what Maullin calls "female worms," which, if they were not nuts, must have been limbs of the old tempter of Eve—which would of course carry the Stripping Plate back before Noah, and indicate that some of its family came through in the Ark.



This is a Vibrator Molding Machine for Flasks 26x26.

Has 12″ Draft and Power Ramming.

The Tabor Mfg. Co.

ELIZABETH, N. J.

Schuchardt & Schutte, Berlin, Germany. *James Hartley & Co., of Manchester, Ltd., Manchester, Eng.*

PATTERN MAKER'S time is expensive. Nowhere else can so great an amount of labor be saved by so small an investment as in a Pattern Shop Nowhere else is time-saving equipment so generally lacking, and out-of-date equipment so often found in use.

We have had sixteen years' experience in manufacturing and selling Pattern Shop Machinery, nothing else. By concentrating all our ample facilities and knowledge on a small line of these machines we have gained "Know How" in construction not to be found elsewhere.

For sixteen years we have been in close touch with the best Pattern Shop practice. We have thus gained the "Know How" also in the way to equip a Pattern Shop to make it the most successful. We have seen our theories proven to be facts.

Oliver Wood Trimmers are prime requisites for economical production of pattern work. We have fourteen styles and sizes. In a word, Oliver Wood Trimmers are machines which take the place of hand work with planes, chisels and squares in Pattern Work. Our Oliver Wood Trimmer Book is worth your study. We enjoy mailing them.

Oliver Band Sawing Machines are not the ordinary kind, neither are Oliver Hand Planers or Jointers. They are Pattern Shop Tools; designed and built for the most accurate and economical production of fine Pattern Shop work. A complete description will convince you of their superiority.

We have other machines required in Pattern Shops equally necessary and equally superior. Ask about them.

It might possibly pay you to scrap your present outfit and buy an up-to-date Oliver equipment. It will certainly pay you to write for information.

AMERICAN MACHINERY CO., Grand Rapids, Michigan

MANUFACTURERS OF

OLIVER PATTERN SHOP MACHINERY

The Foundry

WHICH is doing business to-day without a

MILLETT CORE OVEN

does not know what it is to have a core room without friction.

Some foundries make cores which look "good enough to eat." Other shops will have cores which are mere mud pies. It is needless to say that perfect castings can not be made without perfect cores. But let a core be made right it yet requires to be dried right before it will be perfect. For this purpose there is but one Core Oven—**THE MILLETT.**

Suppose you write for our booklet describing the **MILLETT CORE OVEN?** We will give you the names of a lot of shops that use them, and of course you will want to be as well equipped as they are.

Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

Satisfied Customers Increase Your Business

When you go into a butcher shop for a nice steak, you will certainly kick if the man behind the block hands you out a slice of meat filled with gristle and bone.

When a customer of yours wants a nice casting, he will certainly object if it is filled with hard spots and grit which dull his tools and costs him extra money to finish.

He may come to you the next time, but the chances are he won't.

He will go to a foundry where they know how to make castings that are soft, strong and easily finished.

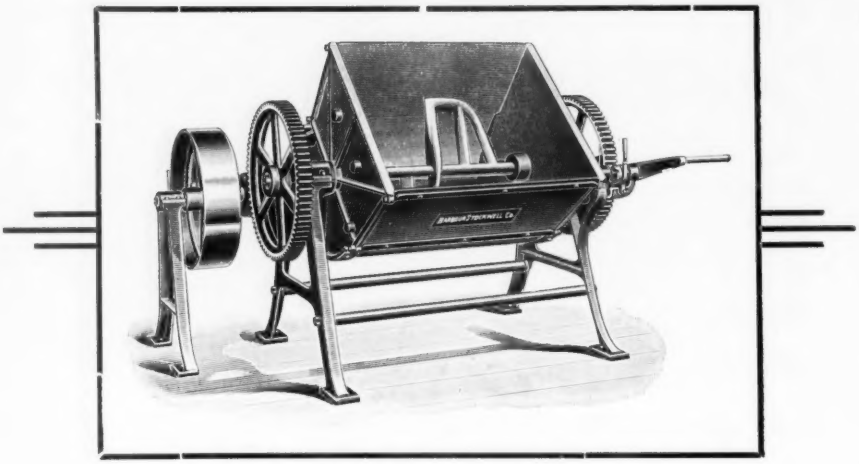
Such foundries use **CHERRY VALLEY IRON.** This is made by the **CHERRY VALLEY FURNACE.** This furnace makes nothing but foundry iron. There is no chance of you paying for one thing and getting another.

You can command a select trade by using **CHERRY VALLEY IRON.** You need a car load now.

The Cherry Valley Iron Co.

Murtland Building PITTSBURG, PA.

Boston Foundry Mixer



DRIVEN BY BELT OR BY MOTOR.

By its use you have a better mixed core-sand and facing at one-half the cost of that mixed by the old methods.

This Mixer is in use in many of the largest Foundries in the United States.

On Exhibition and For Sale by . . .

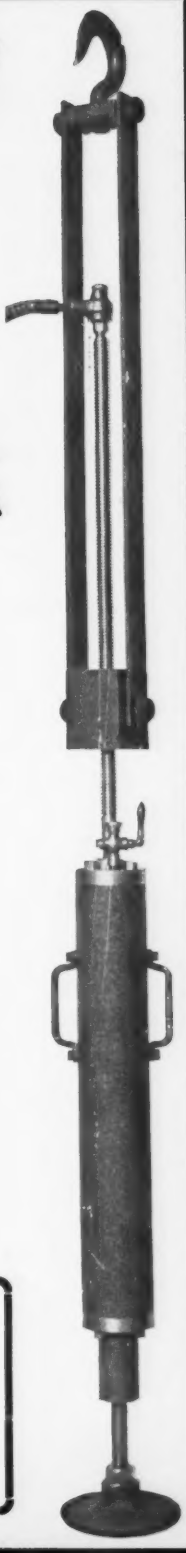
THE S. OBERMAYER COMPANY,

18th and Rockwell Streets, CHICAGO, ILL.

FOR PARTICULARS REGARDING OUR MIXER AND SAND SIFTERS, WRITE

BARBOUR-STOCKWELL CO.,

205 Broadway, CAMBRIDGEPORT, MASS.



Four Men's Work

in ramming is done by one man with our Pneumatic Hand or Floor Rammer, and done better. It strikes 250 blows per minute. It doesn't get tired, never goes out for a drink, doesn't get out of order, and is always on hand Monday mornings.

Only one man is required to work the tool, yet the mold is rammed harder and more evenly, preventing "straining" and loss of metal.

When the casting cools off, use our Pneumatic Hammers for chipping. They do the most rapid work of any hammer ever invented.

Send for Catalogue of our Pneumatic Tools, Chipping and Riveting Hammers, Piston Drills, Rotary Drills, Rammers, etc.

Philadelphia Pneumatic Tool Co.,

NEW YORK PHILADELPHIA PITTSBURG BOSTON

HOME OFFICE: - - - PHILADELPHIA.

COXEY'S SILICA SAND

Is the only material it pays to use in steel molding. All leading manufacturers say so.

Coxey's Silica Sand is the only material it pays to use in making Cores for Iron, Brass or Steel Castings. Here is what a well known foundry foreman says:

THE C. & G. COOPER COMPANY,

CORLISS ENGINES, BOILERS, COMPLETE STEAM PLANTS.

MT. VERNON, OHIO, November 6th, 1900.

MR. J. S. COXEY, Massillon, Ohio.

Referring to the Journal Block Core in a 60 in. Sangye Bed Casting, weighing 58,000 pounds, this was made from your sand with very satisfactory results. The comparative cost is as follows:

OLD SAND.		COXEY'S SAND.	
900 pounds, @ $1.75 per ton,	$0.78½	900 pounds, @ $3.30 per ton,	$1.48½
Labor in cleaning casting,	2.70	Labor in cleaning casting,	.94½
Total, -	$3.48½	Total -	$2.43

Respectfully yours,
HARRY CHALLINGSWORTH,
Foundry Foreman.

This is a Saving of a Dollar and Five Cents on one core, besides making a smoother casting and saving on tools in finishing.

Coxey's Silica Sand is the only material to use for bottoms of Open Hearth furnaces and Malleable furnaces. It outlasts all others.

I will be glad to quote you prices at your works.

J. S. COXEY, MASSILLON, OHIO.

Bridgeport Crucible Company

MANUFACTURERS OF

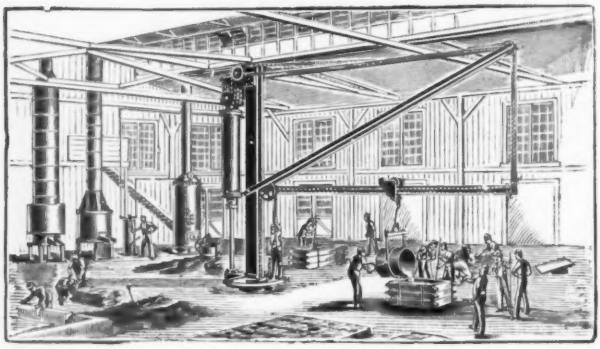
BLACK LEAD CRUCIBLES

Climax Furnace Clay

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U. S. A.

THREE FOUNDRIES



5-Ton Steam Hydraulic Crane in a foundry.

The Benj. Atha & Co. Steel Foundry, of Newark, N. J., got some Ridgway Cranes, then they got some more, then they enlarged and got some more, now they are enlarging again and we are making some more. All these "Some More" Ridgway cranes are used to help the molders.

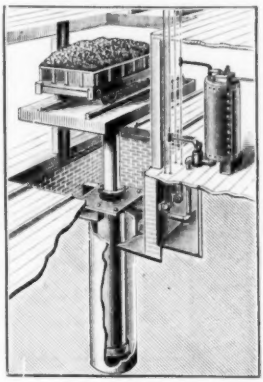
The Tioga Foundry Co. has been using the Ridgway Crane for a number of years. They know something about it. They are building a new foundry and are getting some more Ridgway Cranes.

The American Foundry & Machine Co. wanted to rig out their foundry with cranes, investigated the matter and are getting Ridgway Cranes. And so it goes.

The Ridgway Crane is the most wonderful foundry crane ever designed.

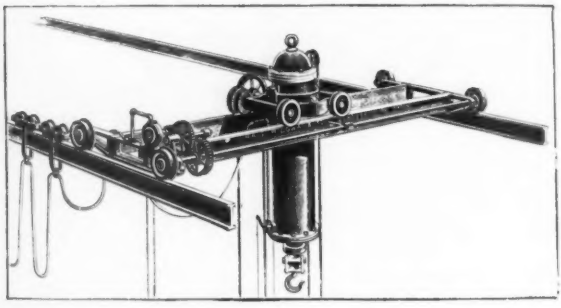
"Please Take the Elevator."

A perfect hydraulic elevator that don't cost a cent to run. Just figure what that old belt driven screw machine has cost you in repairs and bother and you will find that it is not cheap after all. We can supply you the best hydraulic elevators at a cost no greater than a pump. We make them also to set on the ground level and hoist with ropes when you can't dig a well. Best foundries are getting Ridgway Elevators. Go by steam or Air as you like.



Steam Hydraulic Cupola Hoist. Plunger Type.

Oil Governed Air Hoists



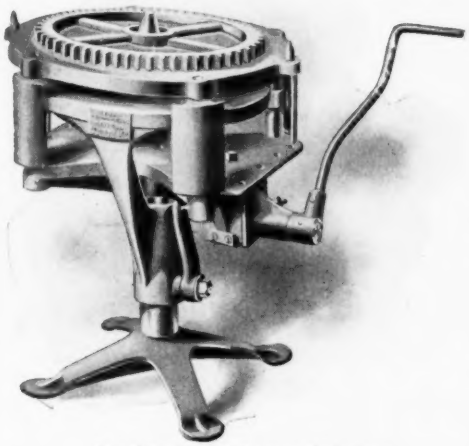
Perfectly safe and will draw patterns and handle delicate molds perfectly. No other hoist will do this. Any old thing will jerk around castings and hurt the men and get a damage suit for you, but there is only one safe and good hoist for a foundry and that is the Ridgway Oil Governed. Get one and try it, if you don't like it send it back. All the references you want.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT, CHAS. G. ECKSTEIN, 16 SPANDAUERSTR., BERLIN, GERMANY.

WARNING

There never was a good thing that someone didn't copy, and the Maywood Rammer has not escaped the imitators. We are the exclusive licensees of patents covering double ended reversible pneumatic sand rammers, and all other such machines are infringements. Prospective purchasers are ***warned against becoming involved*** in pending ***lawsuits*** by using these infringing rammers.



THE MAYWOOD MOLDING MACHINE.

The Maywood Molding Machine

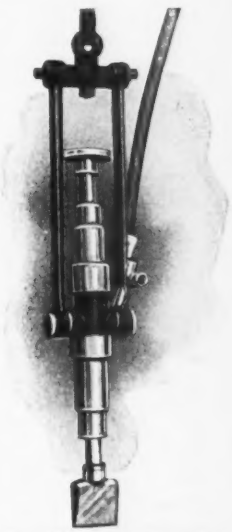
makes perfect castings at a cost with which hand work can not compete.

The Maywood Rammer

relieves the molder of his hardest work and leaves him more time for actual molding.

The result is an increase in output and a decrease in cost of production.

Such a combination ought to interest you.



THE MAYWOOD RAMMER.
(Pat. Nov. 27, 1900)

Maywood Foundry & Machine Co.

MAYWOOD, ILLINOIS.

TROLLEY TRACKS ARE ALL THE GO

They ought to be.

They cost but little to put up.

They cost nothing to keep up.

They can be placed anywhere.

They are always ready.

No dynamo, air compressor, steam boiler or anything else affects them.

They move your stuff on schedule time, and move it cheaply and quickly.

Your big traveling cranes are not in it for moving light and medium heavy loads.

Save your expensive machines by using a trolley track.

Keep everybody busy, by using a trolley track.

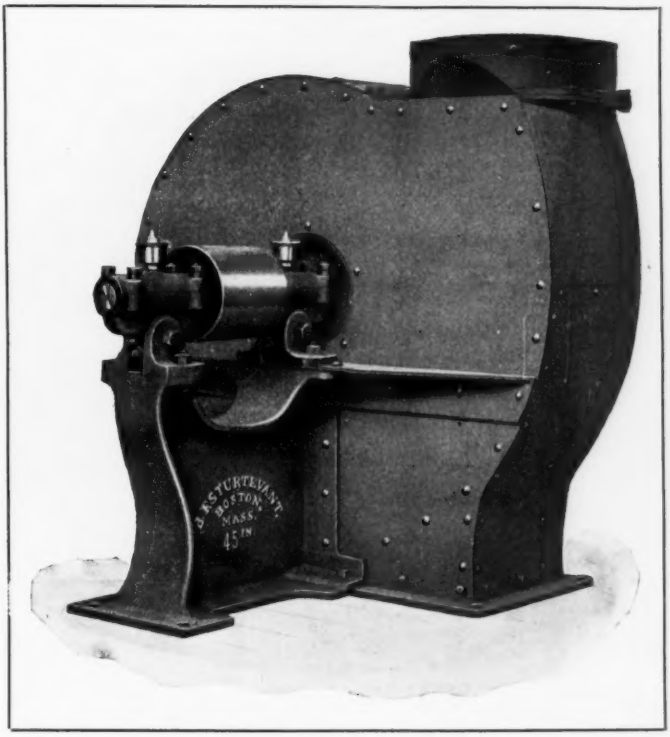
There is only one, **The Coburn.**

Coburn Trolley Track Mfg. Co.

HOLYOKE, MASS., U. S. A.

STEEL PLATE
EXHAUSTERS

FOR TUMBLING BARRELS AND EMERY WHEELS



They keep the atmosphere clear and free from dust. Arranged to be driven by belt or by direct connected electric motor. ::

B. F. STURTEVANT CO.

BOSTON, MASS.

NEW YORK PHILADELPHIA CHICAGO LONDON

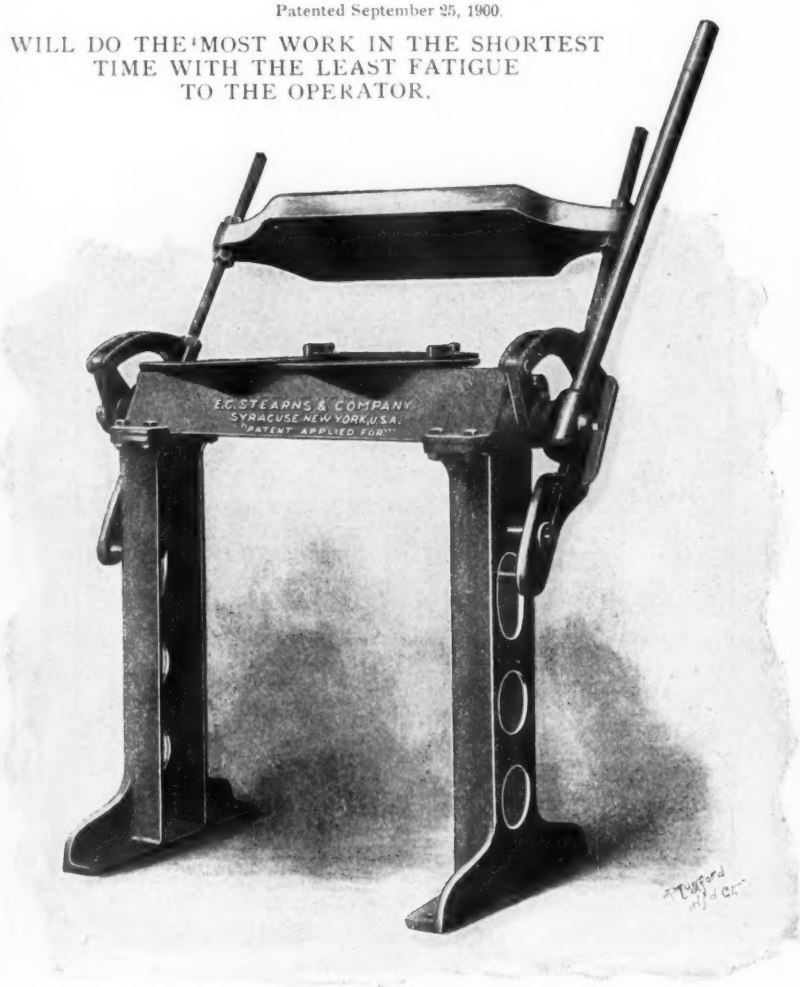
158

THE *Stearns*

MOLDING MACHINE

Patented September 25, 1900.

WILL DO THE MOST WORK IN THE SHORTEST TIME WITH THE LEAST FATIGUE TO THE OPERATOR.



THE PERFECTION OF MOLDING MACHINES.

MANUFACTURED BY

E. C. STEARNS & COMPANY

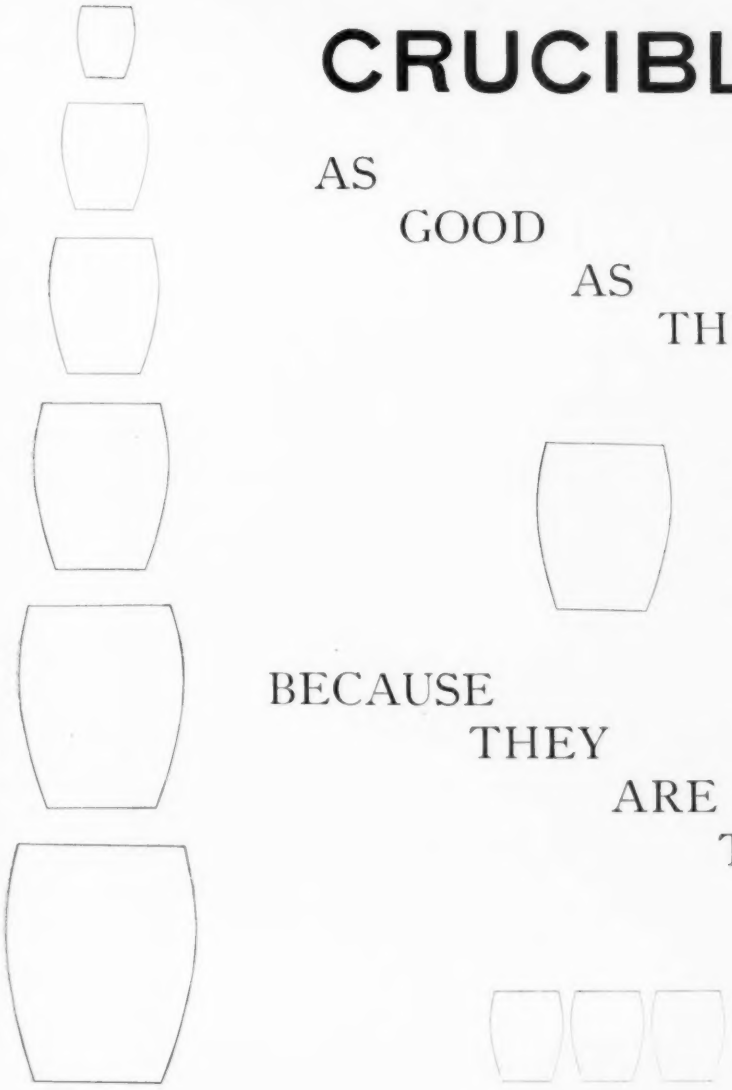
FOUNDERS OF FINE GREY IRON CASTINGS,

WRITE FOR CIRCULAR. SYRACUSE, NEW YORK, U. S. A.

McCullough-Dalzell Company

CRUCIBLES

AS
GOOD
AS
THE
BEST



BECAUSE
THEY
ARE
THE
BEST

McCullough-Dalzell Company

PITTSBURGH, PA.

ELECTRIC TRAVELERS.

CRANES FOR ANY SERVICE.

AIR HOISTS

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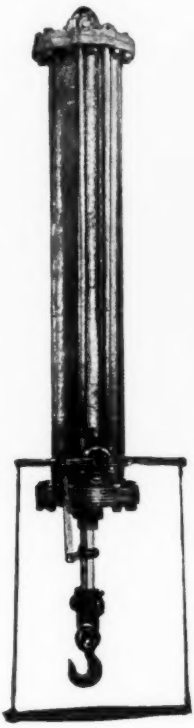

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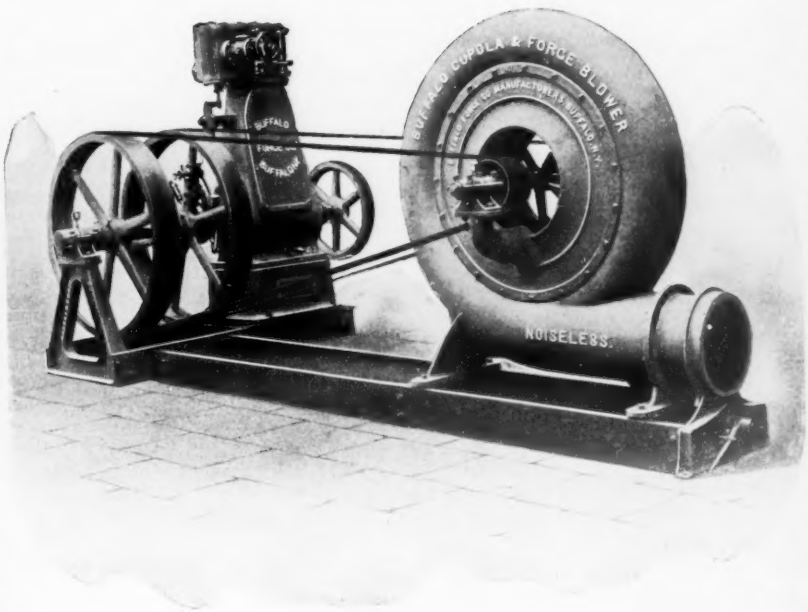

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BUFFALO, N. Y.

NEW YORK. **CHICAGO.**

Alphabetical Index to Advertisers.

Adams Co., The 38
Addy & Co., Matthew 38
American Bridge Co 7
American Glutrose Works 43
American Machinery Co 15
Ajax Metal Co 36

Balkwell Pattern Works 45
Barbour-Stockwell Co 18
Barnard & Leas Mfg. Co 34
Barnett Foundry Co 45
Brass Founders' Supply Co 33
Bridgeport Crucible Co 21
Buffalo Forge Co 29

Carborundum Co 43
Case Manufacturing Co 34
Cherry Valley Iron Co 17
Chicago Pneumatic Tool Co 6
Church, S. R ..... 38 and 42
Clayton Air Compressor Co 34
Cleveland Facing Mill Co 5
Clinton Iron & Steel Co 33
Coxey, J. S 20
Coburn Trolley Track Co 24
Connersville Blower Co ..... Back Cover
Cornell, J. B. & J. M 46
Cowles Electric Smelting and Aluminum Co. ..... Inside Back Cover
Dayton Coal & Iron Co 38
Decamp Bros. & Yule 38
Diamond Machine Co 35
Dings Electro-Magnetic Separator Co 46
Dixon Crucible Co., Joseph 4
Domhoff & Joyce Co 38

Fanner Mfg. Co 44
Fox Machine Co 31

Garden City Sand Co 49
Gobeille Pattern Co 44
Goff, Horner & Co 48
Goodrich & Co., F. A 38
Gould & Eberhardt 43

Hanna & Co., M. A 38
Heyl & Patterson 36
Hillman & Son, J. H 38
Holmes & Co., F. B 42
Hunt Co., C. W 40

International Correspondence Schools 39

Keep, W. J 41

Mack, Thomas A & Co 38
Maurer & Son, Henry 42
Maywood Foundry & Machine Co 33
McCormick Co., J. S 40
McCullough-Dalzell Co 27
Millett Core Oven Co 16
Minerva Pig Iron Co 39
Mohr, J. J 39

Nash & Co., George 35
Northern Engineering Works ..... 31 and 37

Obermayer Co., The S ..... Front Cover

Paxson Co., J. W ..... 1 and 2
Peirson & Co., C. L 39
Philadelphia Pneumatic Tool Co 19
Pickands, Brown & Co 39
Pilling & Crane 39
Presbrey Fire Brick Co 42
Pridmore, Henry E 40

Ridgway & Son Co., Craig 22
Rogers, Brown & Co ..... 39 and 50
Roots Co., P. H. & F. M ..... Colored Insert

Scioto Star Fire Brick Works 42
Sellers & Co., Wm 9
Smith Premier Typwriter Co 37
Smooth-On Manufacturing Co 12
Staten Island Clay Co 42
Stearns & Co., E. C 26
Stover Manufacturing Co 41
Stow Manufacturing Co 37
Sturtevant Co., B. F 25
Superior Charcoal Iron Co 33
Swarts Metal Refining Co 48
Syracuse Malleable Iron Co 13
Syracuse Chilled Plow Co 35

Tabor Manufacturing Co 14

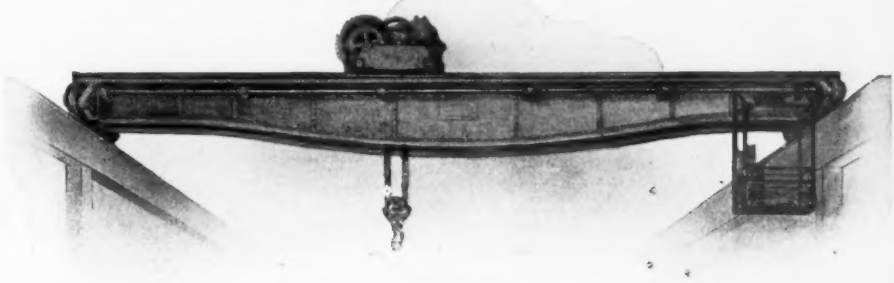
Vrooman, H. S 42

Washington Coal & Coke Co 8
Wells Light Manufacturing Co 10
Whitehead Bros Co 3
Whiting Foundry Equiment Co 28
Wilbraham Baker Blower Co 11

CONTENTS.

Trade Outlook 187
It Is the Dollar that Counts 187
The Taggart Core Oven. Illust 189
The Kranks Korner 190
Bituminous Coal as a Cupola Fuel. Dr. Edward Kirk 194
Premium for Efficiency 195
Corliss Cylinders. Ill. Geo. Buchanan 196
Shot Iron. E. H. Putnam 200
Machine Molding. I. L. McCord 201
Power Ramming and Stripping Plates. E. H. Mumford 207
Keeping His Men 208
Well Done. Illust 209
Serving His Time. Joseph Vincent 209
Molding a Propeller Wheel. Illust. R. H. Palmer 210
The New Hampshire Way. Illust. Thos. Sheehy 213
Greasing the Mold 213
Melting Scrap Brass 214
A Few Criticisms. T. D. West 214
New Essay on a Foundry 215
Paxon-Warren Sand Blast. Illust 216
Co-operation in an Iron Works 217
How I Would Do It. W. H. Kell 217
Pressure of Liquid Iron. Illust. E. B. Gilmour 218
Manganese Mining. Illust. C. H. Vannier 218
What to Do with Trade Papers 220
The Successful Man Reads. Eli H. Pearce 221
Cast Iron Notes. W. J. Keep 223
St. Louis Items 224
Points on Fire Brick 225
Among the Foundries 225
Deaths 230
Fires 230
Personal 231
Then and Now 231

Type No. 105. 3 Motor Electric Traveling Crane.



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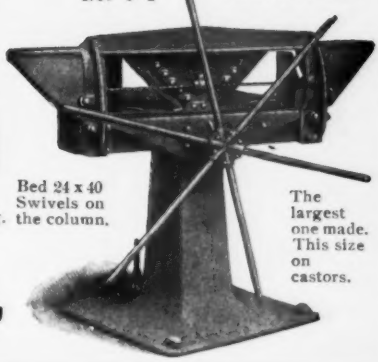

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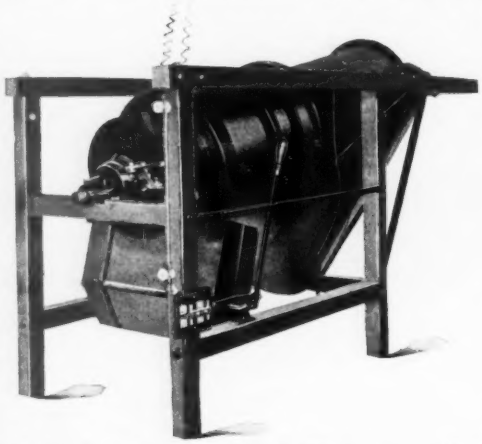

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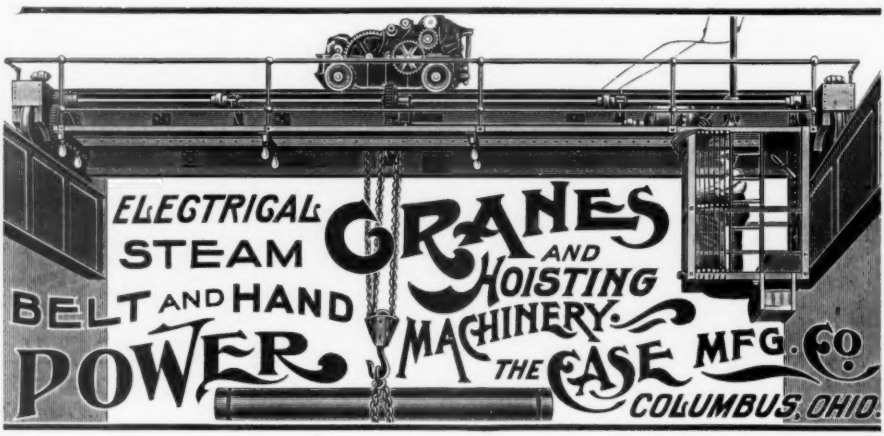

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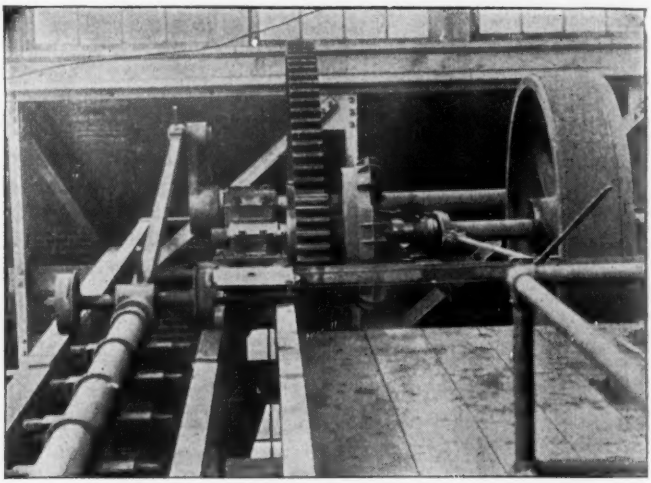

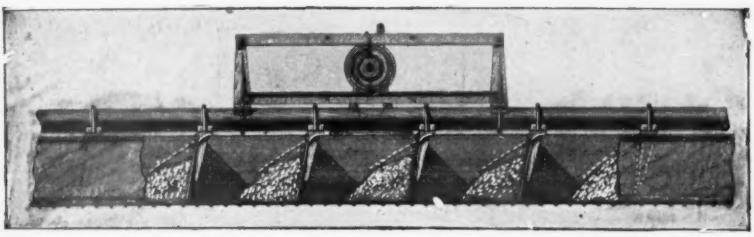

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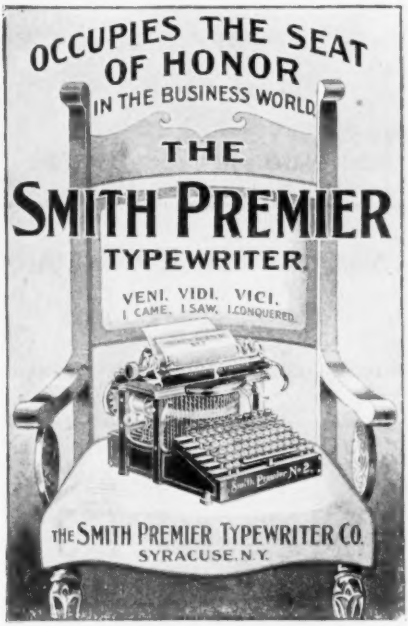

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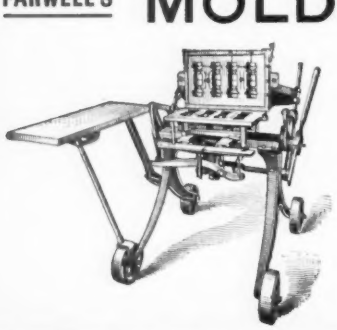

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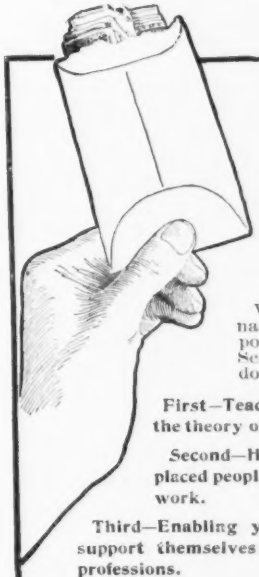

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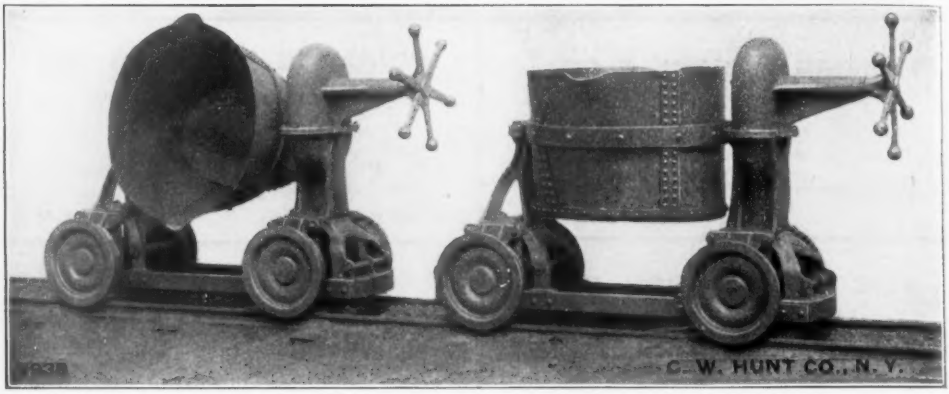

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Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 36 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle, is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

Our system of narrow-gauge tracks, switches, curves, turntables, etc., for use in manufacturing establishments and to accommodate such special cars as the above, is worthy of careful investigation by those who are apt to be interested.

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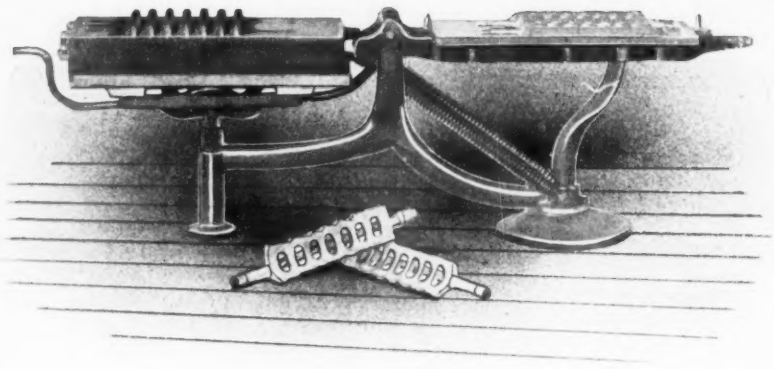

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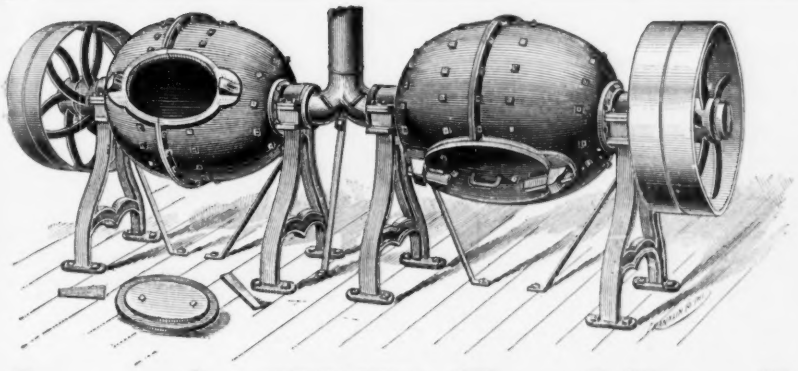

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The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

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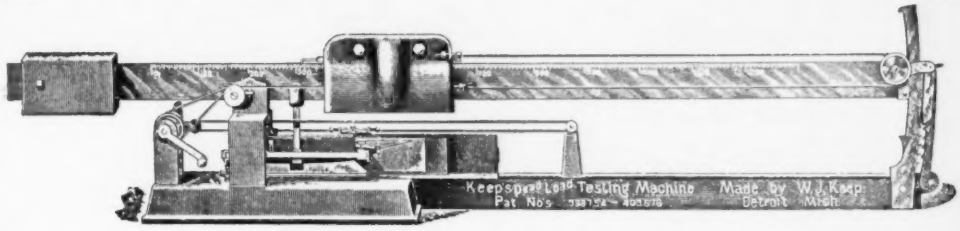

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Write for one of our little booklets and see what we say about . . . . .

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with a Carborundum Wheel will do as much work as two, three or four men with other abrasives—and do it better.

Carborundum not only cuts faster and cleaner than other abrasive wheels, but it lasts longer.

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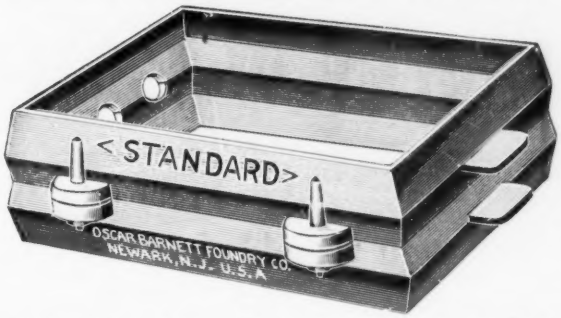

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Makes Cores of which you will be proud.

By its use you will have less loss than ever, and better castings too.

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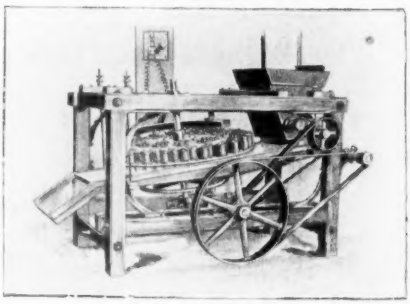

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IS a three hundred and sixty page book, illustrated throughout, treating on the melting of iron and the operation of cupolas.

This book is **not** filled with a job lot of wind jamming theories showing how to melt twenty pounds of iron with a pound of coke. If you are looking for this kind of instruction you either want to consult a pretty good liar or an ignoramus.

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Your cupola tender should know more about melting iron than he does. So should your foundry foreman. As a proprietor you can stand a whole lot more information on this subject before you are overloaded.

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It is the best investment you can make.

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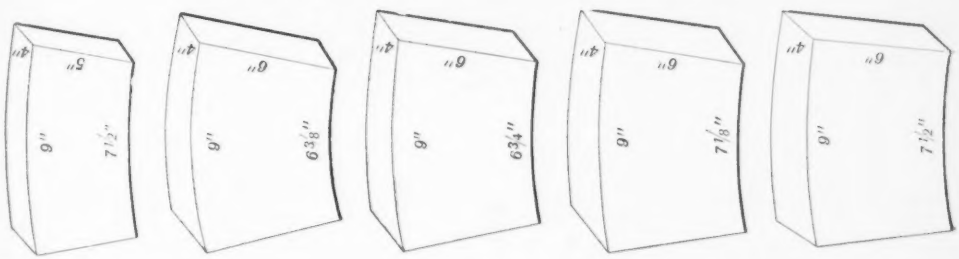

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All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

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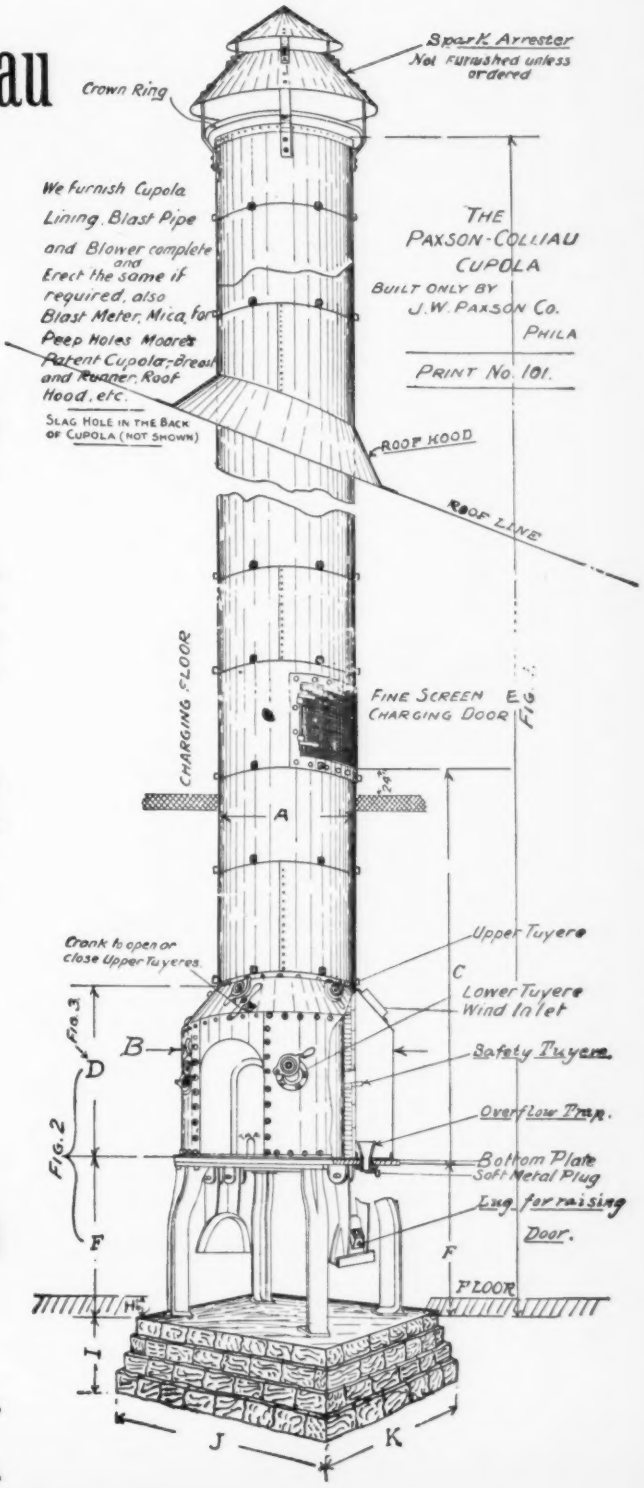

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If you were aware that we are the largest miners and grinders of ***PLUMBAGO*** in the United States you would not ask the question, but would ask for a working sample of our

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X CRUCIBLE LEAD @ 2 " " "

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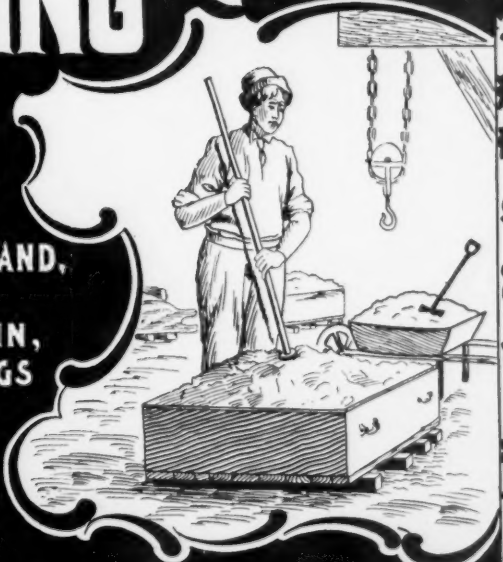

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Run 50 to 60 Heats

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I first am very careful in annealing the crucibles, and am very careful with good tongs not to squeeze them, and after pouring I take my skimmer and scrape all the dross off the inside of the crucible. With good care, and handling with care, I get these good results. I have tried other makes of crucibles but could not get as good results as with Dixon's.

Yours very truly,

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T. P. KELLY & CO.,

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Order No. 86 Detroit, Jan 10th 1901 189....

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Please send the following Via Rail.

1v000	lbs. Heavy Facing.
13500	" Charcoal.

DETROIT STOVE WORKS.

L. J. Conwell Supt.

TERMS; 60 Days or 2% Cash 10th of month following receipt of goods

Please give number of his order on your invoice.

THE PENINSULAR STOVE CO.

15067

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PLEASE FURNISH THIS COMPANY WITH THE FOLLOWING MATERIAL:

Conditional that you shall undertake and agree to furnish same in full of the kinds and quality specified, and subject to our approval. To be delivered F. O. B., at Detroit and consigned to **The Peninsular Stove Company, Detroit, Michigan,** as stated below.

Delivery Febry 1st

1 Car load (60 Bbls) Heavy Facing
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Price and Quality as heretofore furnished.

Terms 2% Cash 10 days

Shipment desired via M. C. R.R.

Peninsular Stove Co
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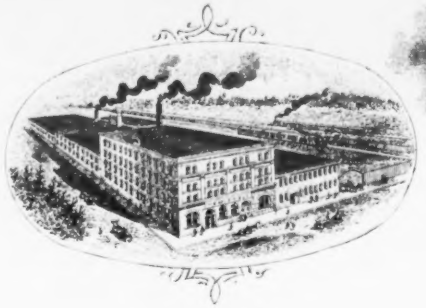
Send Bill of Lading and Invoice with goods.

The following Order Number must be on Invoice.

L 3068

THE FOUNDRY

6



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Price as agreed with your Mr. Kelly. Terms- 2% 10 Days.

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William A. Dwyer

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Our Customers say: "They go beyond guarantee."

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SAND MIXER

Not an Experiment

PRACTICAL
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And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

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GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
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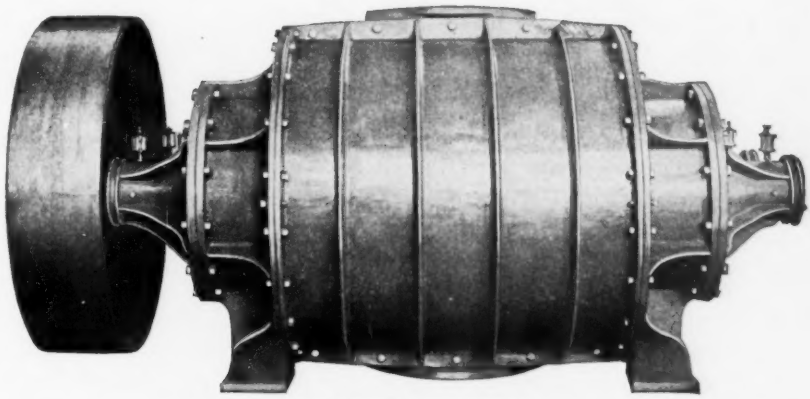
P. A. BRAWNER, JR., Sec'y, & Treas.

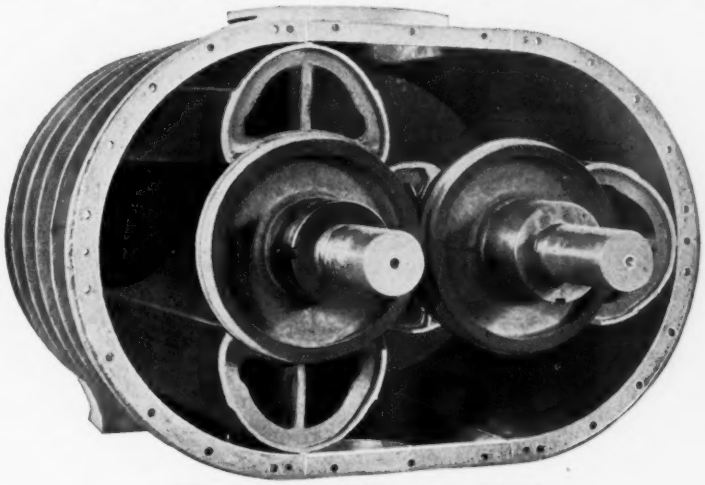
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

You Know how it Goes

When you are in a hurry for a casting, when everything is being rushed to get a mold ready before the bottom is dropped, you know just how things happen.

A little sand may drop into a flange, the cores may not have been as dry as they ought to have been, the iron boils, and in the morning when your customer comes around for this much hurried job you have to to tell him that it is not quite perfect.

This kind 'o makes it look as if you didn't understand the foundry business. Now, if you had provided yourself with a can of ***"SMOOTH-ON CASTINGS,"*** as your neighbor did a long time ago, you would not have had to offer any excuse for that casting.

Instead you would have taken a little ***SMOOTH-ON*** and with this Preparation filled the hole in the flange. If the casting appeared porous where the iron boiled from a wet core you would have put a little ***SMOOTH-ON*** there too. When your customer came you would have to offer no explanation, because the casting would in appearance and everything else be as good as if it had been perfect in the first place.

SMOOTH-ON TRADE MARK

is our trade-mark, and you should see that this appears on the can, as otherwise you may be buying some cheap filler, which will get you in trouble later on.

If in need of Chemical advice or Chemical Analyses, we can assist you. Write for our calalogue giving prices for different Analyses.

SMOOTH-ON MFG. CO.,

ANALYTICAL AND MANUFACTURING CHEMISTS,

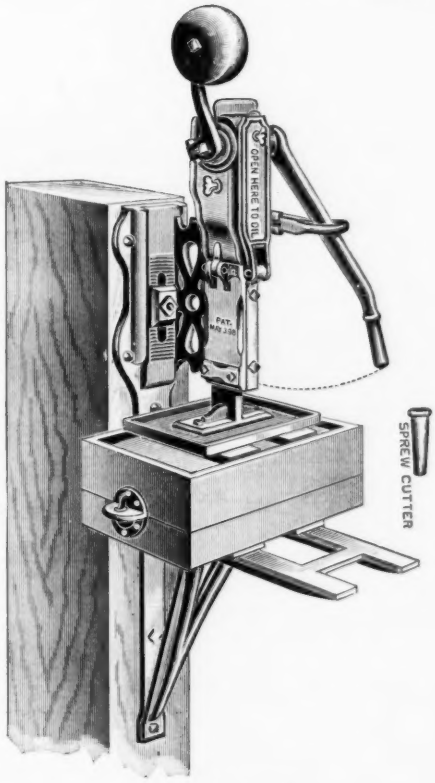
547-549 COMMUNIPAW AVENUE. JERSEY CITY, N. J., U. S. A.

VREELAND TOMPKINS, CHEMIST AND MANAGER.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

DOES NOT REQUIRE A SKILLED MOLDER.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

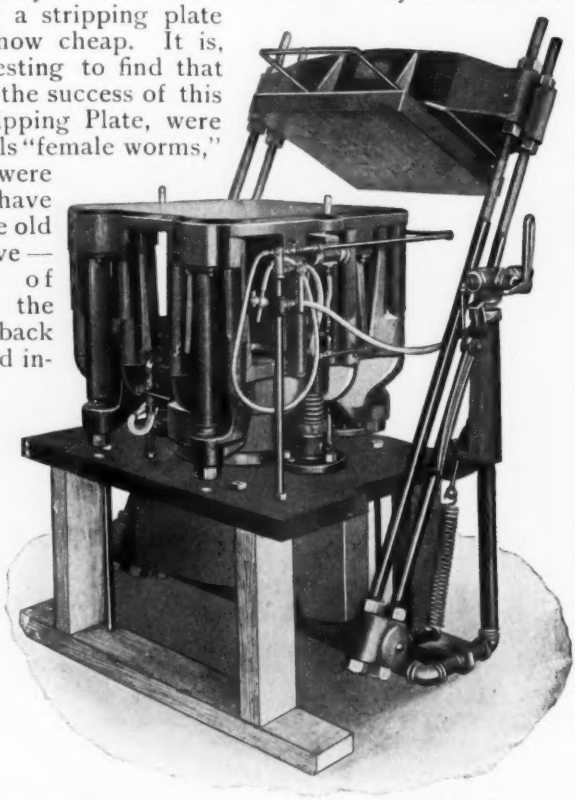
J. W. JACKMAN & CO.,
Sole European Representatives, London, S. W. Eng.

A Bit of Molding Machine History.

The first U. S. Patent for any kind of a Molding Machine was issued early in 1852 to a man named Satterlee, and it was quite a machine—seems to have been in appearance about half way between an eight day clock and a cider press—had "wheels"—of odd kinds, gear, sheave and sprocket, had pitman, levers, pawls, counterweights, chains and toggles—more gear than Kipling put into McAndrews Hymn.

All this mechanical uneasiness was to accomplish what the inventor called "the said work of sifting, filling and pressing."

Thus he omitted from the functions of a machine like a perfecting press and costing almost as much, the drawing of the patterns, the ONLY thing that some foundrymen are today buying $50 machines to do, on each of which they spend upwards of $1,000 for stripping plates and patterns. Satterlee was evidently ahead of his age in the U. S., for in England the very first idea of a molding machine, patented by one Maullin in 1800, was in effect nothing but a Stripping Plate—like some of our machines today—the $50 for machine, $1,000 for patterns kind. Maullin's machine molded screws (gimlet pointed too!), but even he in 1800 would probably have known better than to try to mold a lock case or a flat bevel gear with a stripping plate rig, no matter how cheap. It is, moreover, interesting to find that contributing to the success of this George 3rd Stripping Plate, were what Maullin calls "female worms," which, if they were not nuts, must have been limbs of the old tempter of Eve—which would of course carry the Stripping Plate back before Noah, and indicate that some of its family came through in the Ark.



This is a Vibrator Molding Machine for Flasks 26x26.

Has 12" Draft and Power Ramming.

The Tabor Mfg. Co.

ELIZABETH, N. J.

Schuchardt & Schutte, Berlin, Germany. *James Hartley & Co., of Manchester, Ltd., Manchester, Eng.*

IT IS JUST AS MUCH

To your interest that you should have a perfect core oven as a perfect cupola.

Count up your loss of castings and note that by far the larger part of this is due to imperfect cores.

The Core Oven suitable for large cores and molds is not the one to use for medium and light cores.

Besides if you get in a hurry for a core, and this happens almost every day, you can not receive it promptly from a large oven. With the **Millett Core Oven,** you can have a core any time you want it. This oven is one which stays in operation continuously, something which no other core oven does. If you desire to improve the output of your foundry investigate the **Millett Core Oven.** We have some printed matter you should read. Will you ask us to send it.

Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

YOU NEED SOME GOOD IRON

During the excitement of the iron trade last year many a foundryman bought iron which he is finding it difficult to use. Such iron was made by furnaces which changed from one ore to another and accepted any kind of fuel that came along, while we make our own coke and thus obtain uniform results. The only way to get rid of a bad lot of iron is to mix it with some very good iron.

CHERRY VALLEY IRON

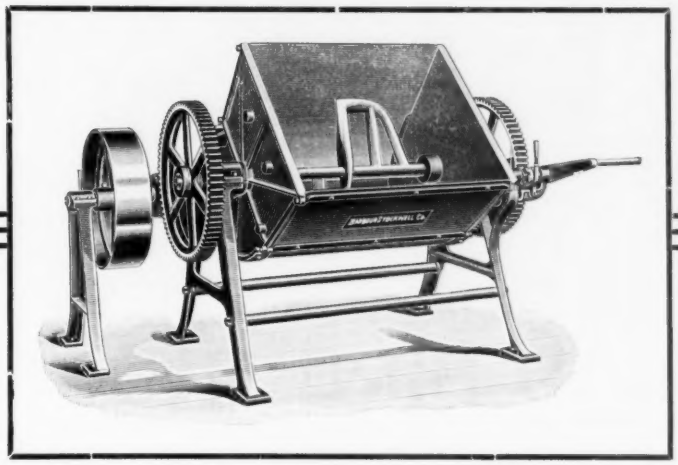
is the best foundry iron that is made. The Cherry Valley Furnace makes nothing but foundry iron. There is no possible chance of getting any other than a first class foundry iron here. Other irons may be sold a few cents cheaper per ton, but you have learned by experience that the best castings are never made from the cheapest iron.

Have your castings of Cherry Valley Quality by using Cherry Valley Iron in your mixture. We are pretty busy and to secure prompt shipment you should give us your order now.

The Cherry Valley Iron Co.

Murtland Building PITTSBURG, PA.

Boston Foundry Mixer



DRIVEN BY BELT OR BY MOTOR.

By its use you have a better mixed core-sand and facing at one-half the cost of that mixed by the old methods.

This Mixer is in use in many of the largest Foundries in the United States.

On Exhibition and For Sale by . . .

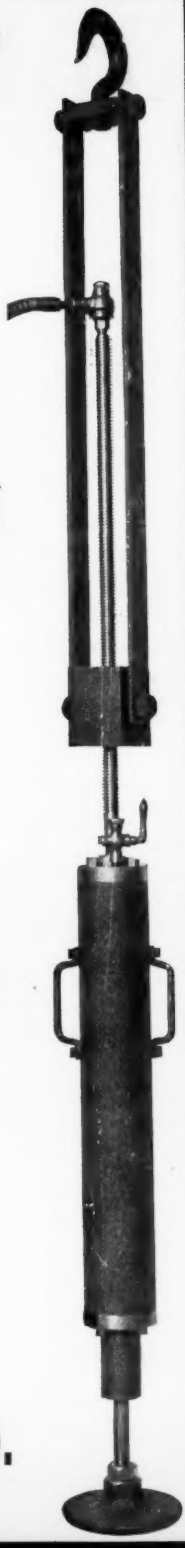
THE S. OBERMAYER COMPANY,

18th and Rockwell Streets, CHICAGO, ILL.

FOR PARTICULARS REGARDING OUR MIXER AND SAND SIFTERS, WRITE

BARBOUR-STOCKWELL CO.,

205 Broadway, CAMBRIDGEPORT, MASS.



LIKE A RAPID-FIRE GUN

is the work of our Pneumatic Chipping Hammers. They strike fifty blows while the hand-chipper strikes one. This isn't merely saving—its REVOLUTION.

The defects of all other pneumatic hammers are overcome in ours by the Valve. It is perfect in principle and faultless in operation.

WITH OUR

PNEUMATIC RAMMER

one man easily does the work of ***eight to twelve men*** using hand-rammers. It rams a mold much harder and more uniformly than can be done by hand, thus avoiding "straining" and loss of metal, as well as loss of castings from over-weight.

Will you try one of these labor-savers for ten days at our risk? Write us about it.

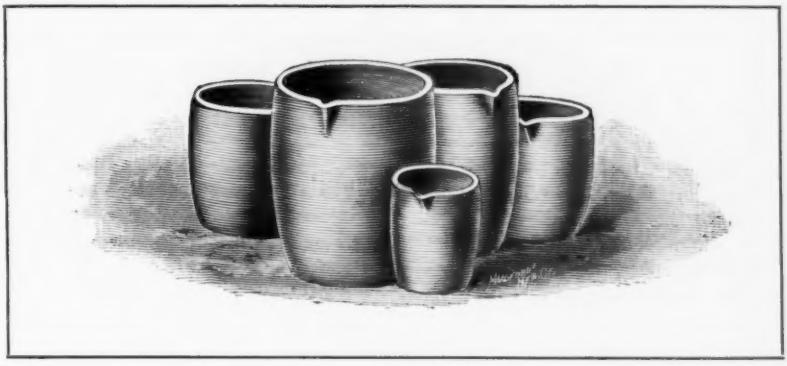
Philadelphia Pneumatic Tool Co.

PHILADELPHIA NEW YORK PITTSBURG BOSTON

BRIDGEPORT CRUCIBLE CO.

MANUFACTURERS OF

BLACK LEAD CRUCIBLES

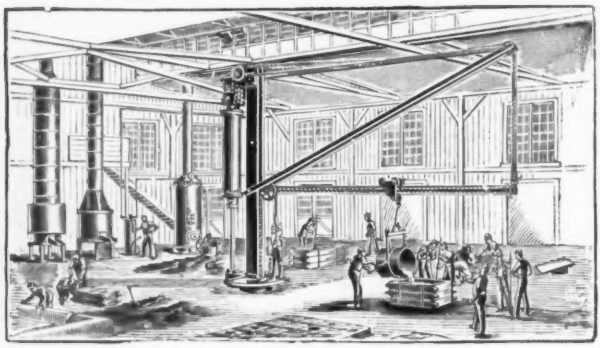


CLIMAX FURNACE CLAY

A CRUCIBLE MIXTURE FOR LINING FURNACES AND SETTING FIRE BRICK

BRIDGEPORT, CONN., U. S. A.

SHOOT THE TRAVELER



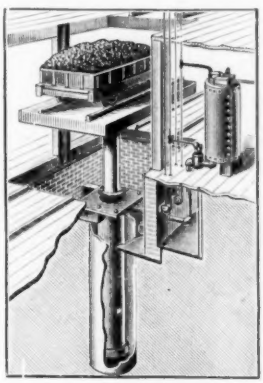
5-Ton Steam Hydraulic Crane in a foundry.

You don't need a traveler. You don't need an Air Compressor, all you have to do is to get one of these wonderful cranes and attach it directly to your boiler. A Ridgway Balanced Steam Hydraulic Crane introduced into your foundry will open those old eyes of yours like dinner plates. Talk about making money! Well you just ask the hundreds of foundries where they are using Ridgway Cranes, all of them keep getting more cranes right along.

If you now have a traveler and have the usual disappointment and it looks as if you must go and buy another traveler—well, don't do it—but instead get a Ridgway Crane, bolt it along the runway and let it show you what it can do for you. It will be a revelation to you and you then will know why all Ridgway Crane users are so enthusiastic about it.

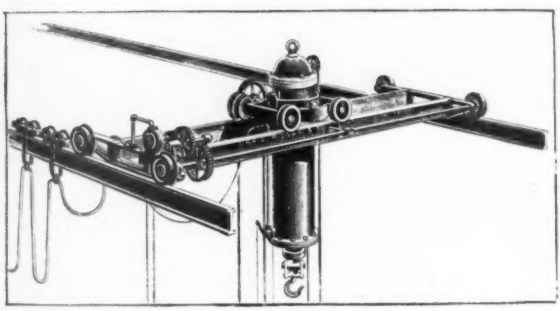
"Please Take the Elevator."

We make them like this little cut and also to set on the ground and avoid the well digging. These are the only cupola hoists to get. We make cheaper sorts to go by air but the Steam Hydraulic is by all odds the best as it is always ready to go and don't depend on air compressors but hooks right to the boiler.



Steam Hydraulic Cupola Hoist. Plunger Type.

Oil Governed Air Hoists



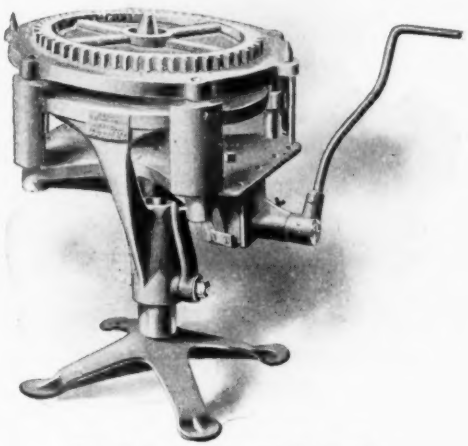
These are the only successful foundry air hoists. Motion is perfect. No jerks. No air gun business. Will draw patterns and handle most delicate molds. Is what foundrymen have long wanted. Get one and try it. If it don't suit you send it back.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT, CHAS. G. ECKSTEIN, 16 SPANDAUERSTR., BERLIN, GERMANY.

WARNING

There never was a good thing that someone didn't copy, and the Maywood Rammer has not escaped the imitators. We are the exclusive licensees of patents covering double ended reversible pneumatic sand rammers, and all other such machines are infringements. Prospective purchasers are ***warned against becoming involved*** in pending ***lawsuits*** by using these infringing rammers.



THE MAYWOOD MOLDING MACHINE.

The *Maywood Molding Machine*

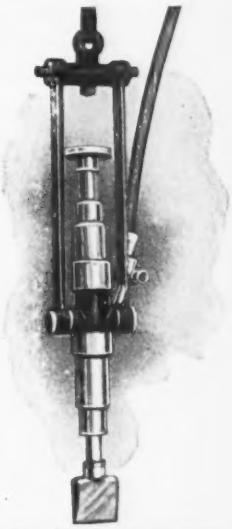
makes perfect castings at a cost with which hand work can not compete.

The *Maywood Rammer*

relieves the molder of his hardest work and leaves him more time for actual molding.

The result is an increase in output and a decrease in cost of production.

Such a combination ought to interest you.



THE MAYWOOD RAMMER.
Pat. Nov. 27, 1900.

Maywood Foundry & Machine Co.

MAYWOOD, ILLINOIS.

EVERY NEW FOUNDRY

That you read about these days uses the trolley track.

It does not matter what kind of castings it makes. The modern shop is not well equipped unless it has a trolley track system.

What makes the trolley track so popular is its low cost and high efficiency.

Anything that has to be moved about a foundry can be handled on the trolley track. It is much cheaper to shift things around this way than to use wheelbarrows and trucks.

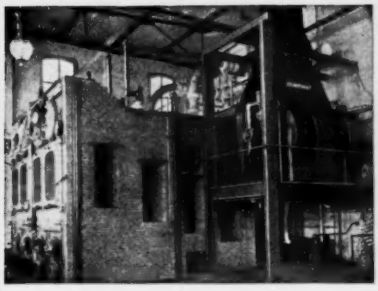
You should join the great procession of trolley track users. Your workmen will not have to wait for a single thing when you have a **Coburn Trolley Track** in your shop.

This in itself means more money in the bank at the end of the year.

Coburn Trolley Track Mfg. Co.,

HOLYOKE, MASS., U. S. A.

IT DOES AWAY WITH A CHIMNEY



MECHANICAL DRAFT

COSTS FAR LESS

Is independent of weather. The fan is positive in action. Responds instantly to sudden demands for more steam. Burns cheap fuel. Costs practically nothing for operation when exhaust steam is utilized

143

B. F. STURTEVANT Co BOSTON, MASS.

NEW YORK - PHILADELPHIA - CHICAGO - LONDON

Directory of Leading Dealers in and Manufacturers of Fire Brick

FRESH SNOWBALLS

ALWAYS ON HAND.

The Kind That Do Not Melt.

Also, Cowen, T. Carr, M. T., and other brands of English Fire Brick,

Brown Baisley (Scotch Fire Brick,)
T. Carr, (English Fire Tiles).

S. R. CHURCH,

307 Sansome Street. San Francisco.

F. B. HOLMES & CO.,

Manufacturers and Shippers of

Works:
Clarion Co. Pa.
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FIRE BRICK

Brands:
Steel
Savage
Mountain
Holmes.

Best for Malleable Furnace and Cupola Work.

DETROIT. - - - MICH.

Established 1856.

HENRY MAURER & SON,

Manufacturers of

FIRE BRICK of All Shapes and Sizes.

Cupola Linings, Etc.

420 E. 23rd Street, NEW YORK.

Works—Maurer, N. J.

Presbrey Fire Brick Works

TAUNTON, MASS.

FIRE BRICK for All Purposes.

Extra quality Fire Brick suitable for Iron Trade. Largest Stock in the State, all Shapes and Sizes.

Kiln Brick, Cupola and Furnace Blocks a Specialty.

Finest Quality Fire Mortar and Crude Clay. Shipments promptly anywhere. Send blue prints for our prices on Special Work.

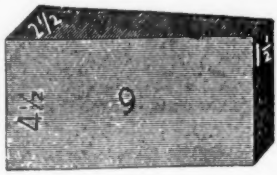
STATEN ISLAND CLAY CO.,

WOODBRIDGE, N. J.

"Royal Star" and "Scioto Star"

High grade FIRE BRICK.

Best for Rolling Mills, Blast Furnaces, Foundries, etc. "Try our Cupola Blocks and Scioto Ground Clay."



The Scioto STAR Fire Brick Works,

PORTSMOUTH, OHIO.

Send for Catalogue.

Established 1871.

Incorporated 1876.

Telephone, Canal 267.

FIRE BRICK and MOLDING SAND.

All Grades and Shapes of Fire Brick and Cupola Block.

H. S. VROOMAN,

220 West Twentieth Street,

CHICAGO.

MR. FOUNDRYMAN:

You remember, if you don't you will the next time you are in the shop, how tired it makes you to watch that man, may be a laborer, more than likely a molder, humped up over a sand pile with a riddle between his legs shaking a little sand through it. Slow work, ain't it, and hard work too? The man has a tired feeling also. Just watch him for a few minutes, and you will make up your mind that he takes his doses in about the proportion of one shake to two of rest. Well, that's all right. You would not do any more yourself, because it would make you tired. Yes, we have the remedy for this tired feeling, and you can afford to take it at about the rate of one for every six molders, for at that rate it will pay for itself every ninety days. Yes, I know that a few of you have the large shaking power machines in your shops, or probably a revolving screen, but you know that you cannot afford to use it. If the stationary power screen had been a money saver you would find one in every molding shop in the country, but they are scarce, and the reason is because it is cheaper to riddle by hand than to wheel your sand to the stationary machine and then wheel it back again. The practical, ideal way is to screen your sand right where you want to use it and screen it by power.

Price, $60 00 Net F. O. B. Chicago

Price, $50.00 Net F. O. B. Chicago.

The ***HANNA PNEUMATIC SCREEN SHAKER*** does this, does it cheap. The cost of running this machine is powerful little, about 20 cubic feet of free air per minute and two drops of oil. The instructions for running also are powerful simple. In other words, "Any old way," because the machine is "fool-proof," and by the way the Post machine can be operated as well by steam as with compressed air, the only differenee being that in moving you have to make two union connections, instead of one as with the Pneumatic machine, because the exhaust steam would not be a pleasant thing to allow to escape freely into the foundry. Don't want to bother you with too much of this at one time, but if you are interested, write for further particulars, or send your order for screens to, Yours for all there is in it,

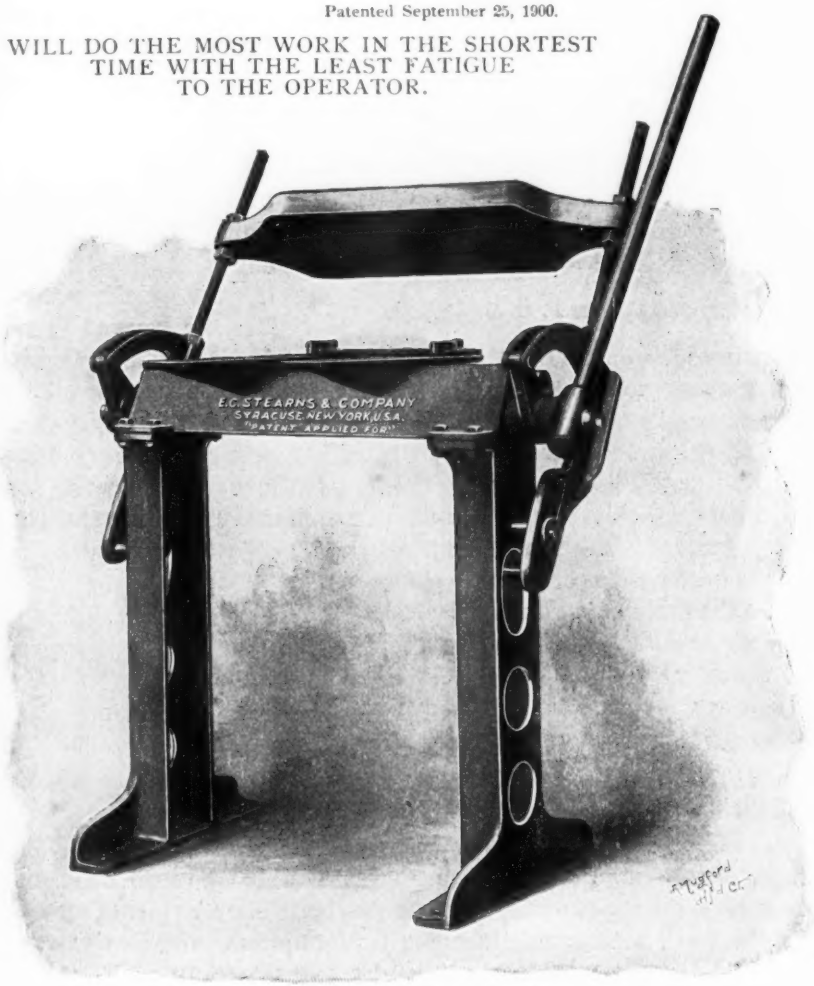
751 Cullom Avenue, Chicago, Ill. **E. E. HANNA.**

THE *Stearns*

MOLDING MACHINE

Patented September 25, 1900.

WILL DO THE MOST WORK IN THE SHORTEST TIME WITH THE LEAST FATIGUE TO THE OPERATOR.



THE PERFECTION OF MOLDING MACHINES.

MANUFACTURED BY

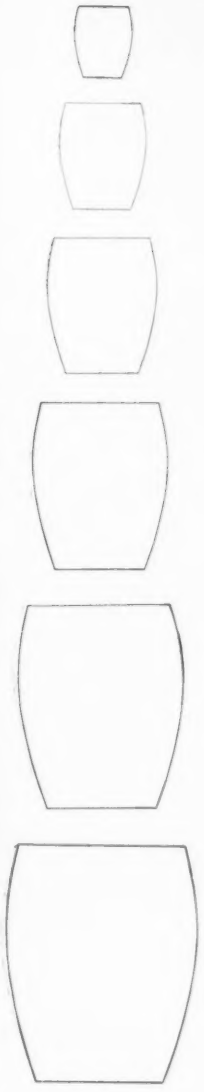
E. C. STEARNS & COMPANY

HARDWARE MANUFACTURERS, FOUNDERS OF FINE GREY IRON CASTINGS AND MAKERS OF THE STEARNS SNAP FLASKS. :: ::

WRITE FOR CIRCULAR.

SYRACUSE, NEW YORK, U. S. A.

McCullough-Dalzell Company



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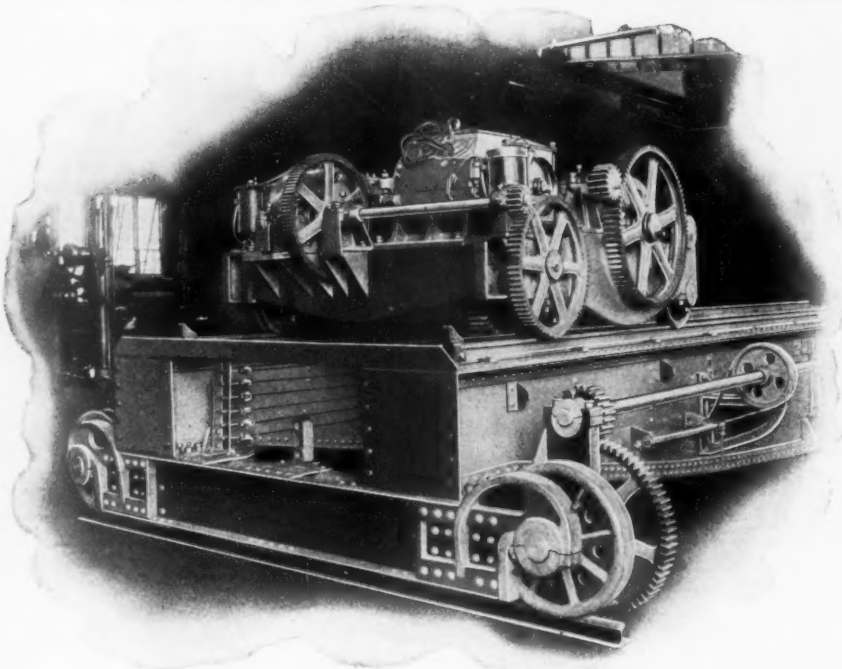
McCullough-Dalzell Company

PITTSBURGH, PA.



30 TON ELECTRIC TRAVELING CRANE.
View shows the construction of our improved "Underbody" truck, furnished only with "Whiting Cranes."

CRANES FOR ALL PURPOSES

ELECTRIC, AIR AND HAND. ALL STYLES

AIR HOISTS VERTICAL AND HORIZONTAL TYPES.

Elevators for Foundries, operated by Electric, Compressed Air or Belt Power.

The Whiting Cupola

WELL CONSTRUCTED, GOOD RESULTS, 750 IN SERVICE. THE BEST ON THE MARKET.

Engineers and Designers of Complete Foundry Plants.

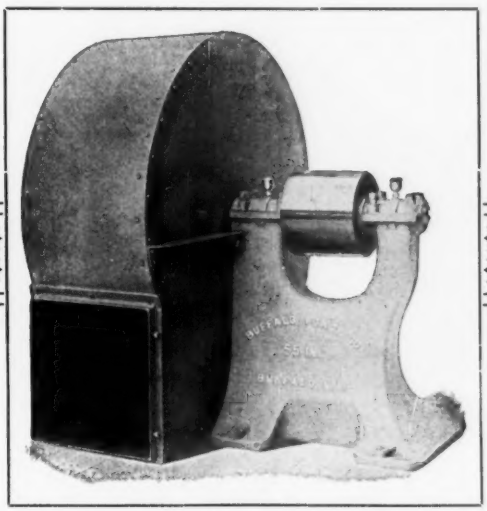
CATALOGS 18, 20, 21 FREE ON APPLICATION.

WHITING FOUNDRY EQUIPMENT CO.

GENERAL OFFICE AND WORKS;
LATHROP AVENUE, **HARVEY, ILL., U. S. A.** (CHICAGO SUBURB.)
CHICAGO OFFICE: 1543 MARQUETTE BUILDING.

BUFFALO TUMBLING BARREL EXHAUSTERS

A Necessity for Health and Comfort in Casting-Cleaning Rooms. Thoroughly efficient, easily applied :: :: ::



Buffalo Tumbling Barrel Exhauster

Buffalo Forge Company,

BUFFALO, N. Y.

NEW YORK. CHICAGO.

Alphabetical Index to Advertisers.

Adams Co., The 40
Addy & Co., Matthew 40
Ajax Metal Co 38
American Bridge Co 9
American Glutrose Works 45
American Machinery Co 45

Builders Iron Foundry 37
Barbour-Stockwell Co 19
Barnard & Leas Mfg. Co 36
Barnett Foundry Co 37
Brass Founders' Supply Co 44
Bridgeport Crucible Co 21
Buffalo Forge Co 31

Carborundum Co 45
Case Manufacturing Co 36
Cherry Valley Iron Co 18
Chicago Pneumatic Tool Co 8
Church, S. R ..... 26 and 40
Clayton Air Compressor Co 36
Clinton Iron & Steel Co 44
Coburn Trolley Track Co 24
Connersville Blower Co ..... Back Cover
Cornell, J. B. & J. M 33
Cowles Electric Smelting and Aluminum Co ..... Inside Back Cover

Dayton Coal & Iron Co 40
Decamp Bros. & Yule 40
Dixon Crucible Co., Joseph 4
Dolan Sand Co 42
Domhoff & Joyce Co 40

Fanner Mfg. Co 46
Fox Machine Co 47

Garden City Sand Co 49
Gobeille Pattern Co 46
Goff, Horner & Co 48
Goodrich & Co., F. A 40
Gould & Eberhardt 47

Hanna, E. E 27
Hanna & Co., M. A 40
Heyl & Patterson 38
Hillman & Son, J. H 40
Holmes & Co., F. B 26
Hunt Co., C. W 42
International Correspondence Schools 41

Kelly & Co., T. P ..... 5, 6 and 7
Keep, W. J 43

Mack, Thomas A., & Co 41
Mauer & Son, Henry 26
Maywood Foundry & Machine Co 23
McCormick Co., J. S 49
McCullough-Dalzell Co 29
Millett Core Oven Co 17
Minerva Pig Iron Co 41
Mohr, J. J 41

Nash & Co., George 37
Northern Engineering Works ..... 33 and 39

Obermayer Co., The S ..... Front Cover

Paxson Co., J. W ..... 1 and 2
Peirson & Co., C. L 41
Philadelphia Pneumatic Tool Co 20
Pickands, Brown & Co 41
Pilling & Crane 41
Presbrey Fire Brick Co 26
Pridmore, Henry E 47

Ridgway & Son Co., Craig 22
Rogers, Brown & Co ..... 41 and 50
Roots Co., P. H. & F. M ..... Colored Insert

Scioto Star Fire Brick Works 26
Sellers & Co., Wm 11
Smith Premier Typewriter Co 39
Smooth-On Manufacturing Co 14
Staten Island Clay Co 26
Stearns & Co., E. C 28
Stover Manufacturing Co 43
Stow Manufacturing Co 39
Sturtevant Co., B. F 35
Superior Charcoal Iron Co 44
Swarts Metal Refining Co 48
Syracuse Malleable Iron Co 15

Tabor Manufacturing Co 16

Vrooman, H. S 26

Washington Coal & Coke Co 10
Wells Light Manufacturing Co 12
Whitehead Bros. Co 3
Whiting Foundry Equipment Co 30
Wilbraham Baker Blower Co 13

CONTENTS.

Trade Outlook 233
The Foundry Business in 1900 234
Foundry Flasks 235
New Steel and Iron Foundries of the Sargent Company. Illustrated 237
Evening School for Workmen 240
Curiosity Shops. C. Ritic 241
Answer to D. H. R. Illustrated. Old Foreman 241
Sampling Pig Iron. Illustrated. W. G. Scott 242
Answers to Inquiries. F. A. B 245
Mexico and Its Foundries. S. D. Beach 246
Machine Molding 247
Some Criticisms. Illustrated. Thos. D. West 249
Some Features of Shop Management. Illustrated. Henry O'Neil 250
Early Days in Mine-opolis. The Judge. 251
American Vs. British Pig Iron. Making. 253
The Fracture of Pig Iron. Edward Kirk 254
Pennsylvania's Pioneer Blast Furnaces. 256
Molding Locomotive Driving Wheels. Illustrated. L. C. Jewett 258
Pointers on Molding Sands 260
A Circulating Library 260
Among the Foundries 261
Malleable Iron Trade in Eastern Penna. 264
Crane Co. and Their Employees 265
Saw Tooth Roof for a Foundry. Illustrated. W. P. Hunt 266
Deaths 267
Fires 267
Vrooman Foundry Riddle. Illustrated .. 268
Notes from Various Sources 268
Annealing of White Cast Iron. Charles James 270
Brass Founding. Illustrated. C. Vickers 274
Among the Molders 276
Buffalo Foundrymen's Association 278
Three Methods of Molding. Illustrated. 278

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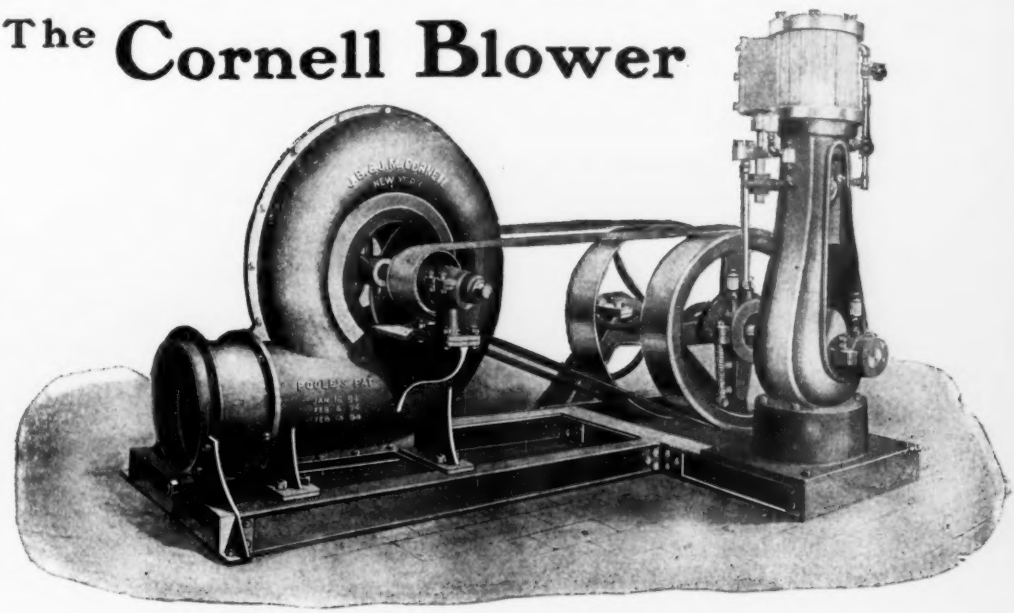

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Roots second-hand, bought, sold or exchanged. All my blowers are overhauled by expert blower machinists. I do not advertise a "fake" list of blowers not in my possession; my stock is constantly changing. Write for particulars and prices.

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The best way to get rid of any little thing about your shop, for which you have no further use, is to insert a few lines describing it on this page.

This is the common meeting ground for buyers and sellers of foundry equipment.

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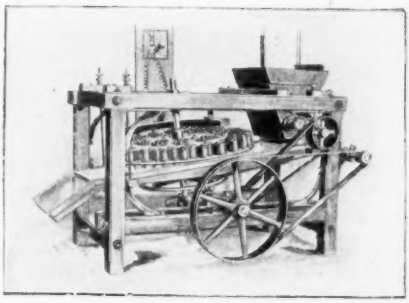

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Gentlemen:—Referring to your inquiry as to our experience with your magnetic separator, we beg to say that we have had it in use for about two years, and its performance has been entirely satisfactory. It is in fact by far the best machine for the purpose we have any knowledge of, and would not think of doing without it. We shall be glad to show its operation to anybody interested, as we consider it far in advance of any machine for this purpose on the market. Yours truly,

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Per Edward Reynolds, Supt.

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Foundry Publishing Co.,

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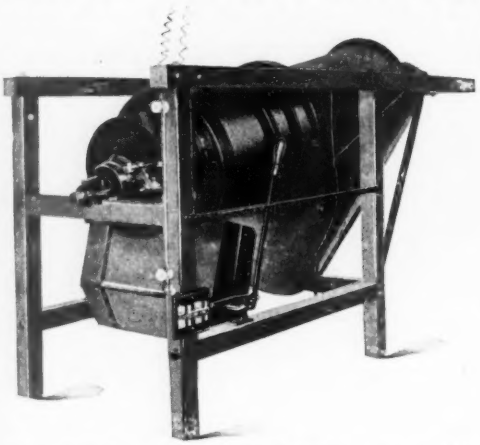

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Get a Magnetic Separator and separate the iron from your foundry offal. The best machine of this kind ever put on the market. It is durable in construction and efficient in operation. Will pay for itself in a few months.

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We saved up the waste from our foundry and cupola for five heats (we melting every other day or three times a week and averaging some 5,000 lbs. of iron each heat.) This waste saved from the five heats weighed 8350 lbs., and on running it through your machine it separated and saved 1201 lbs. of iron.

On this showing we calculate the machine ought to net us after deducting all expenses of operating same, at least 35% each year on the cost price of $300. We consider this a strong test of the machine, as we had our cupola and other waste well picked over by hand before putting it aside for the trial test, and furthermore before the test was made we fully believed that our waste of iron was so small that it would not warrant us to buy one of your machines at any price. Very truly yours, MOLINE PUMP COMPANY,
E. H. SLEIGHT, Prest. & Treas.

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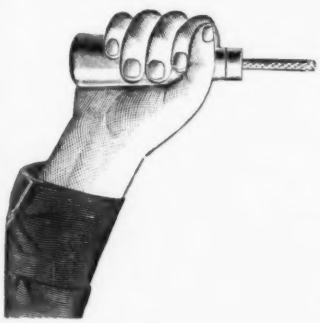

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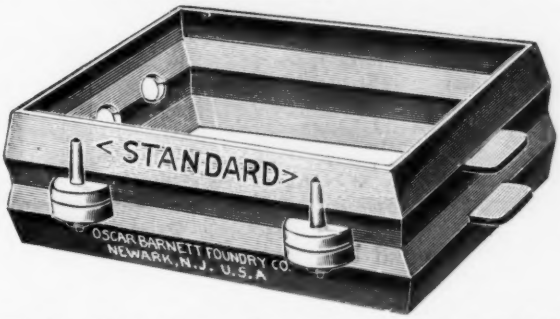

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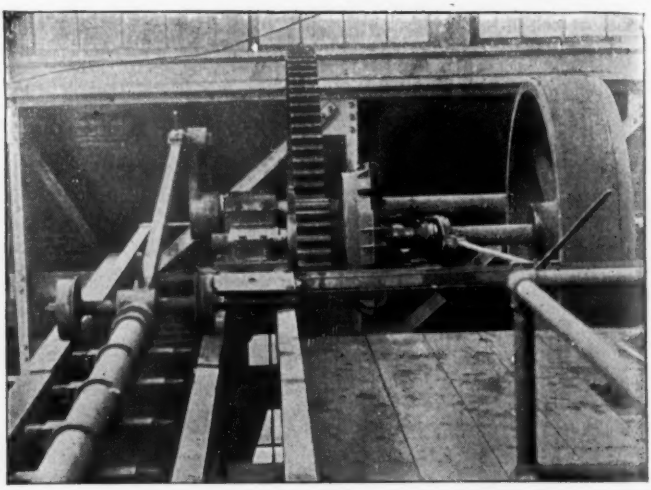

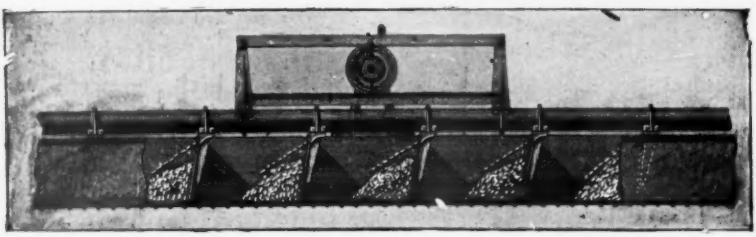

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Complete Installations.

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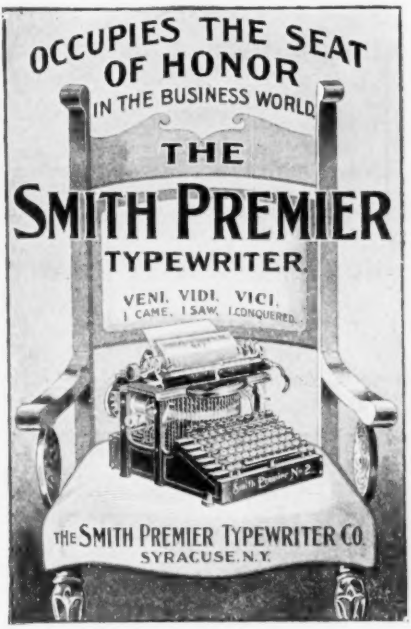

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Take the tool to the work and save heavy handling.

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"Northern Make"

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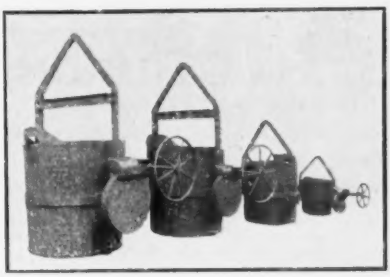

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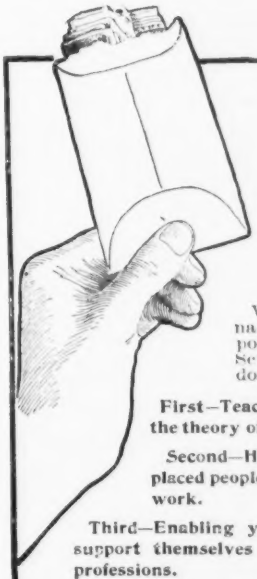

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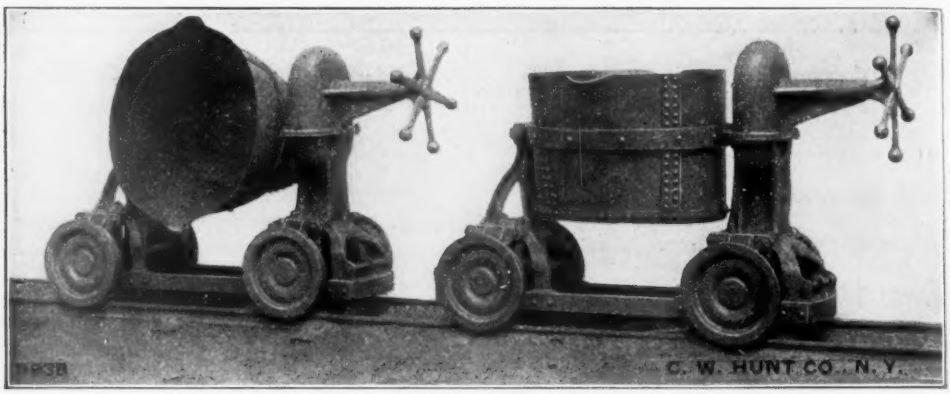

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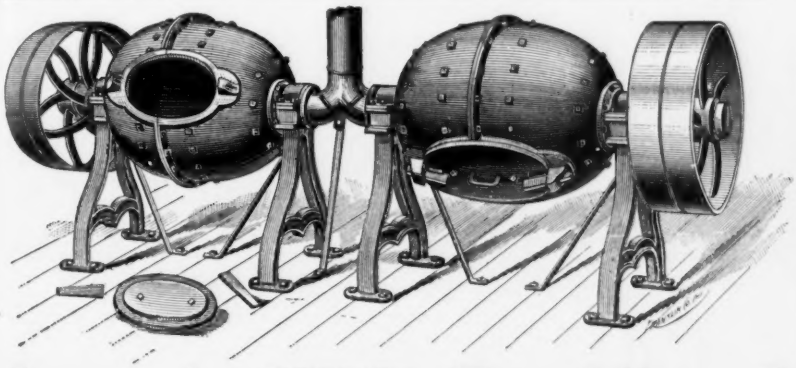
M. DOLAN,
General Manager.

COXSACKIE, N. Y.



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Stover Manufacturing Co.

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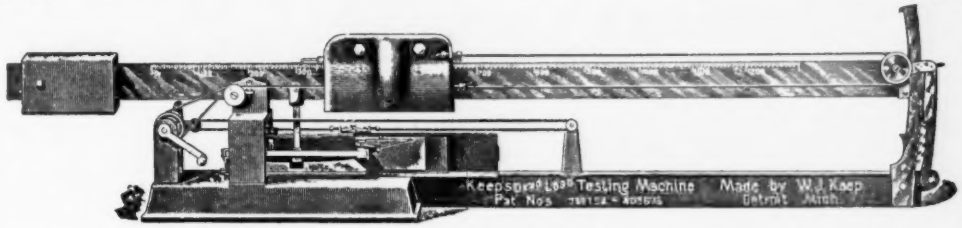

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OF A DESIRED QUALITY

AT A LOW PRICE.

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PHILADELPHIA, PENNA.

WILL REACH US.

Others know us, if you do not.
We would like to know you.

THIS IS A REAL
CORE COMPOUND.

CARBORUNDUM

"You should not make such durable wheels, if you expect to sell many, to the same firm."

That is what one customer said, when we asked him why we did not receive a second order for Carborundum Wheels.
At another time we sold three Carborundum grinding wheels to a prominent car wheel concern. Not receiving an additional order we sent a representative to find the trouble—and he found it. The first Carborundum Wheel had ground 12,088 car wheels before becoming useless—The second had ground over 15,000—and was still in good working order—The third was still to hear from. The best emery wheel record in the firm's history was 9,970.

If you want us to prove these Carborundum facts—write.

The Carborundum Co.
NIAGARA FALLS, N. Y.

.. THE ..

Price and Quality

of Fanner Chaplets are two good reasons why you should use these goods.

You can't begin to make a decent chaplet at one half the cost we can furnish it to you, freight prepaid.

Then why continue to loose castings and being annoyed in the foundry? We give the same attention to small as large orders.

... THE ...

Fanner Mfg. Co.,

Brookside Park,

CLEVELAND, OHIO.

Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

A Good Opportunity

for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

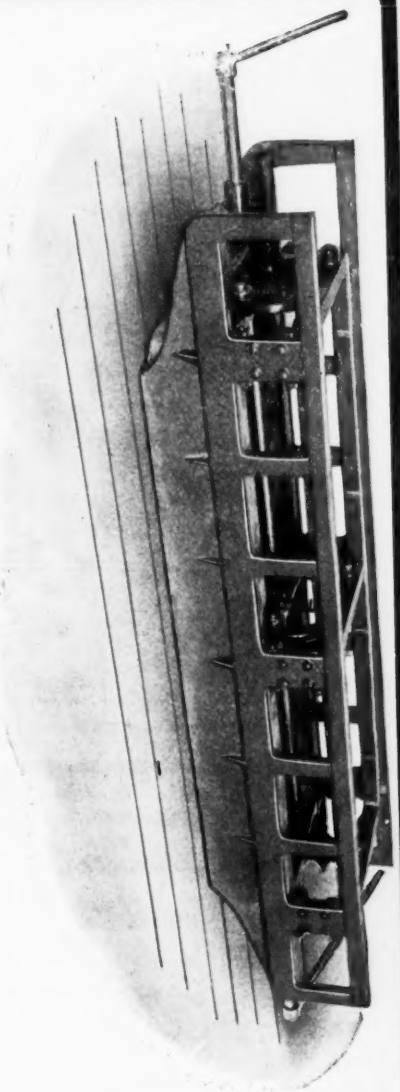
The business has been established since 1868 and is in a paying condition.

A full chance is offered intending purchasers to investigate. Address,

FOUNDRY AND MACHINE SHOP,
Box 309, care The Foundry,
DETROIT.

Thing a moment! What would be the moral effect in your establishment if you had a few patterns made here?

The
Gobeille Pattern Co.
Cleveland, Ohio.



24 IN. BY 9 FT., DOUBLE SHAFT, 6 CRANK, 6 WAY MACHINE.

PRIDMORE

Molding Machines

MANUFACTURED BY

Henry E. Pridmore

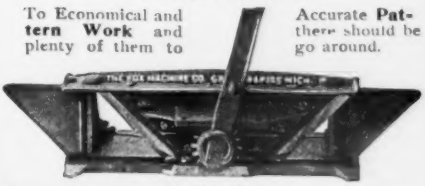
NINETEENTH AND ROCKWELL STS.

CHICAGO, - ILLINOIS.

FOX TRIMMERS

ARE INDESPENSABLE

To Economical and **Pattern Work** and plenty of them to

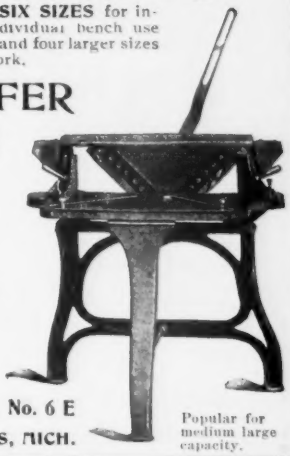


Accurate **Pattern** should be go around.

WE MAKE **SIX SIZES** for individual bench use and four larger sizes for the heavier work.

WE OFFER

to send any of them on **30 days trial.**



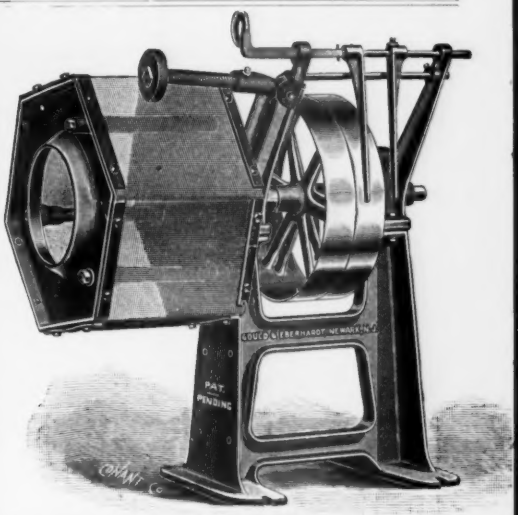
DRILLS
SHAPERS
MILLERS

Write for Catalogue.

FOX MACHINE CO. 850 N. Front St. No. 6 E

GRAND RAPIDS, MICH.

Popular for medium large capacity.



Messrs. Gould & Eberhardt, Newark, N. J.:

GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

BELL & FYFE FOUNDRY CO.

GOULD & EBERHARDT, NEWARK, N. J.

Agents { Schuchardt & Schutte, Berlin, Cologne, Vienna, Brussels, Stockholm, St. Petersburg. John Lang & Sons, Johnstone, Scotland; and England. Selig, Sonnenthal & Co., London, England.

Swarts Metal Refining Co.

SMELTERS AND REFINERS

WE are supplying brass foundries throughout the country with our "high-grade" Metals. We carry at all times a large stock of Phosphor Ingot Bronze, Red Ingot Brass, Yellow Ingot Brass, Ingot Copper, Spelter, Antimony, Pig and Bar Lead, Pig and Bar Tin, in fact, any metal known to the trade and used in the making of Brass Castings. We also carry a stock of the best makes of Crucibles at the lowest prices.

Try a small barrel of our Iron Flux at seven (7) cts. per lb. for the purifying and removing of Iron in the making of Brass Castings.

We also supply brass foundries with Scrap Metals of all kinds, at the lowest market prices, put up in crucible shape, if so desired.

Main Office and Works, 18-20 N. Desplaines St.,

ESTABLISHED 1885
INCORPORATED 1895

CHICAGO, ILL.

CORRESPONDENCE SOLICITED.

COKE

"ALEXANDRIA," High Grade, Low Sulphur, FURNACE and FOUNDRY COKE.

Made exclusively from washed coal. Special care taken in grading and selecting for **FOUNDRY** use.

HIGHEST QUALITY. LOWEST PRICES.

SATISFACTION GUARANTEED.

WRITE

Goff, Horner & Co.

PIG IRON, STEEL, COAL and COKE

308-309-310 Lewis Building, PITTSBURG, PA.

Every Foundry has a Blacksmith

EVERY BLACKSMITH NEEDS A GOOD BLOW.

ALL KINDS AND SIZES OF BLOWERS.

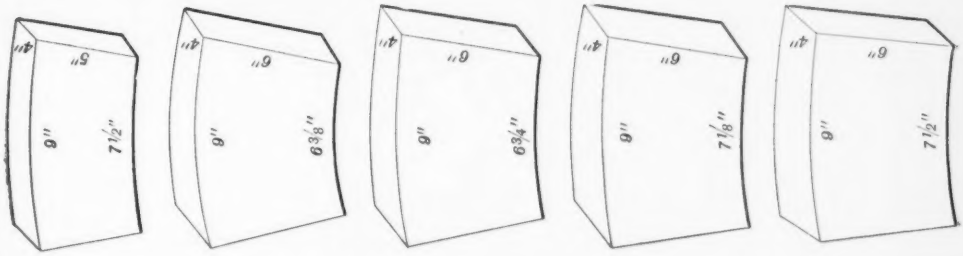
J. S. McCORMICK COMPANY,

Foundry Supply House

PITTSBURG, PA.

"Franklin Crown" and "Sligo"

MAKE THE BEST BLAST FURNACE LININGS ON EARTH.



If that is true then they must be excellent for Cupolas, Boilers, etc. We make every conceivable shape in **Fire Brick.** Our **Fire Clay** is used almost exclusively by the large Steel Companies in the west. Send us a trial order, you'll never regret it.

The Garden City Sand Co. 3 TELS. ALL M 4827. 188 Madison Street, CHICAGO.

ALL AGREEMENTS ARE CONTINGENT UPON STRIKES AND OTHER DELAYS UNAVOIDABLE OR BEYOND OUR CONTROL.

I. S. VAN CLEVE, Pres't. JOHN R. McDONALD, Sec'y. & Treas. HENRY C. KELSEY. E. F. CLARK, Vice Pres't.

ERIE FOUNDRY COMPANY,

MACHINERY CASTINGS.

PLEASE ADDRESS ALL COMMUNICATIONS TO THE COMPANY.

Erie, Pa. December 12th, 1900.

Messrs. Clarkson & Ford.,

224 & 226 Front Street,

New York.

Gentlemen:-

Please send us at once a bbl. of core oil on our contract. We are pleased to say that we have now given this oil a very thorough trial and find that it is the best thing of the kind that we have ever used. It is not only efficient but economical and we predict for you a large success with this oil.

Yours truly,

ERIE FOUNDRY COMPANY,

Pres't.

DIRECTIONS FOR USING

PERFECT CORE OIL.

FOR SMALL WORK.

You can use forty measures of sand, either quarts or gallons, to one part of oil; mix them well together and sieve, and if the sand is not tempered as well as a core maker desires it, he can add a little water, but we think that if it is mixed thoroughly no water will be needed.
In small cores you do not need wire.

FOR RADIATOR WORK.

For this you can use thirty-five parts of sand to one part of oil and do away with wiring. You can also use this oil with a mixture of part loam and sharp sand.

FOR LARGER CORES

such as engine cores and big work, use twenty to twenty-five parts of sand to one part of oil.

WRITE FOR BOOKLET AND PRICE TO

CLARKSON & FORD, *224 Front Street, NEW YORK CITY, U. S. A.*